

Teacher's Manual



Bought from
HARVARD YENCHING GRANT

TEACHER'S MANUAL

*For Military, Marine,
Vocational, and
Industrial
Training*

NICHOLAS MOSELEY

Lieutenant Commander

United States Coast Guard Reserve



New York 1943

Cornell Maritime Press

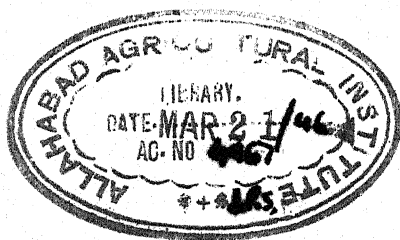
Copyright 1943 by Cornell Maritime Press

Manufactured in the United States of America

For

Lieutenant Commander C. W. Mendell, U.S.N.R.

Gentleman and Scholar, Officer and Leader, Teacher and Friend



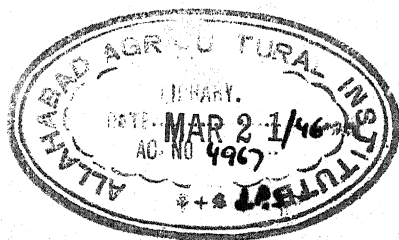
10/10/10

I worked very hard for them and they soon began to work for me.

ADMIRAL SIMS

The two conditions of teaching are: (1) That none can teach more than he knows; (2) That none can teach faster than the scholar can learn.

RALPH WALDO EMERSON



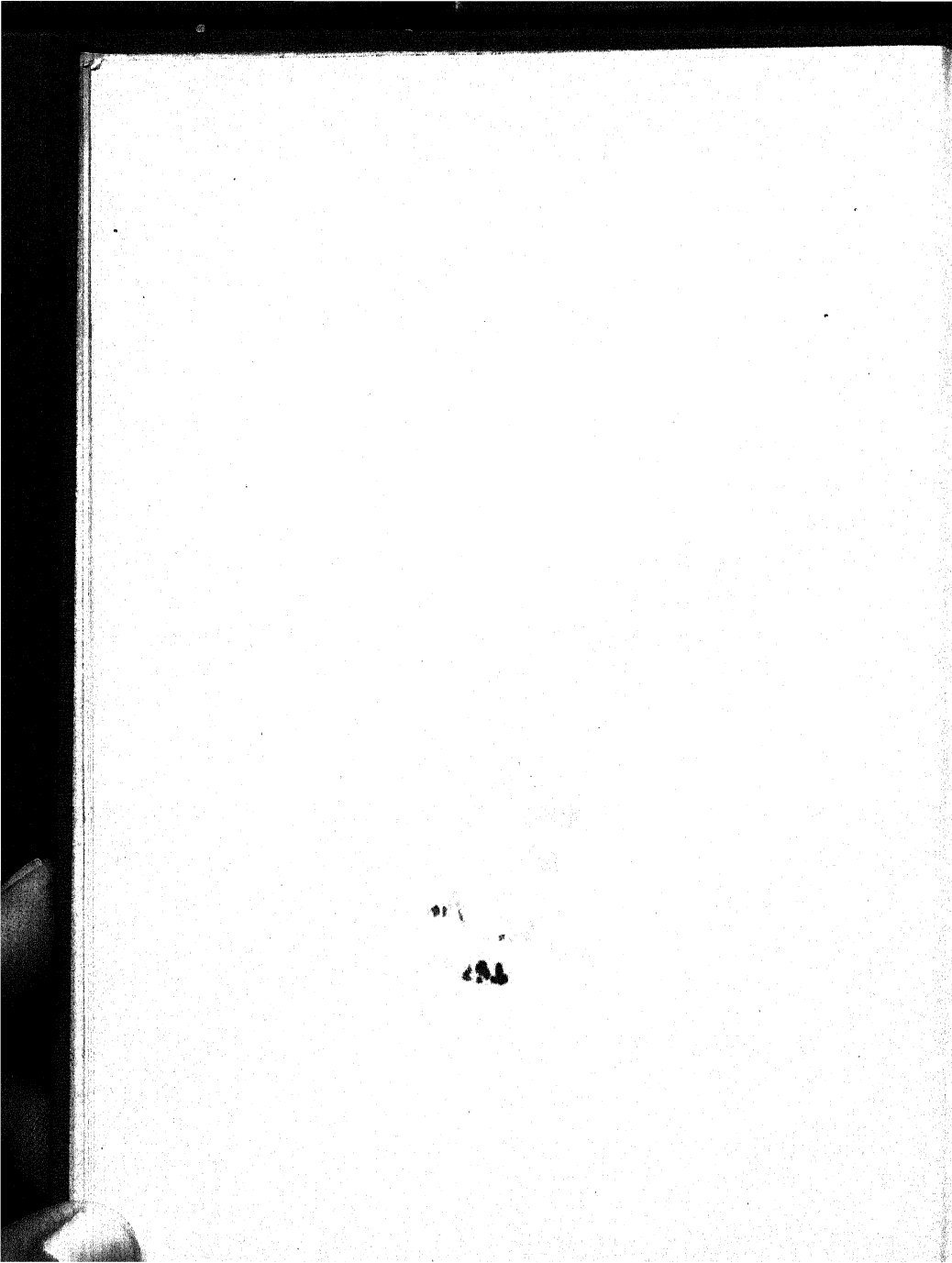


Table of Contents

PART ONE

THE PRINCIPAL METHODS AND THEIR USES

1. The Good Teacher	3
2. A Preview of the Laws of Learning, Memory, and Forgetting	9
3. Choice of a Method	14
4. The Lecture	16
5. The Demonstration	29
6. The Recitation	36
7. The Discussion	50
8. Teaching in Laboratory and Shop	65
9. Visual Education	76
10. The Field Trip	85
11. Criteria for Problems Used in Teaching	91

PART TWO

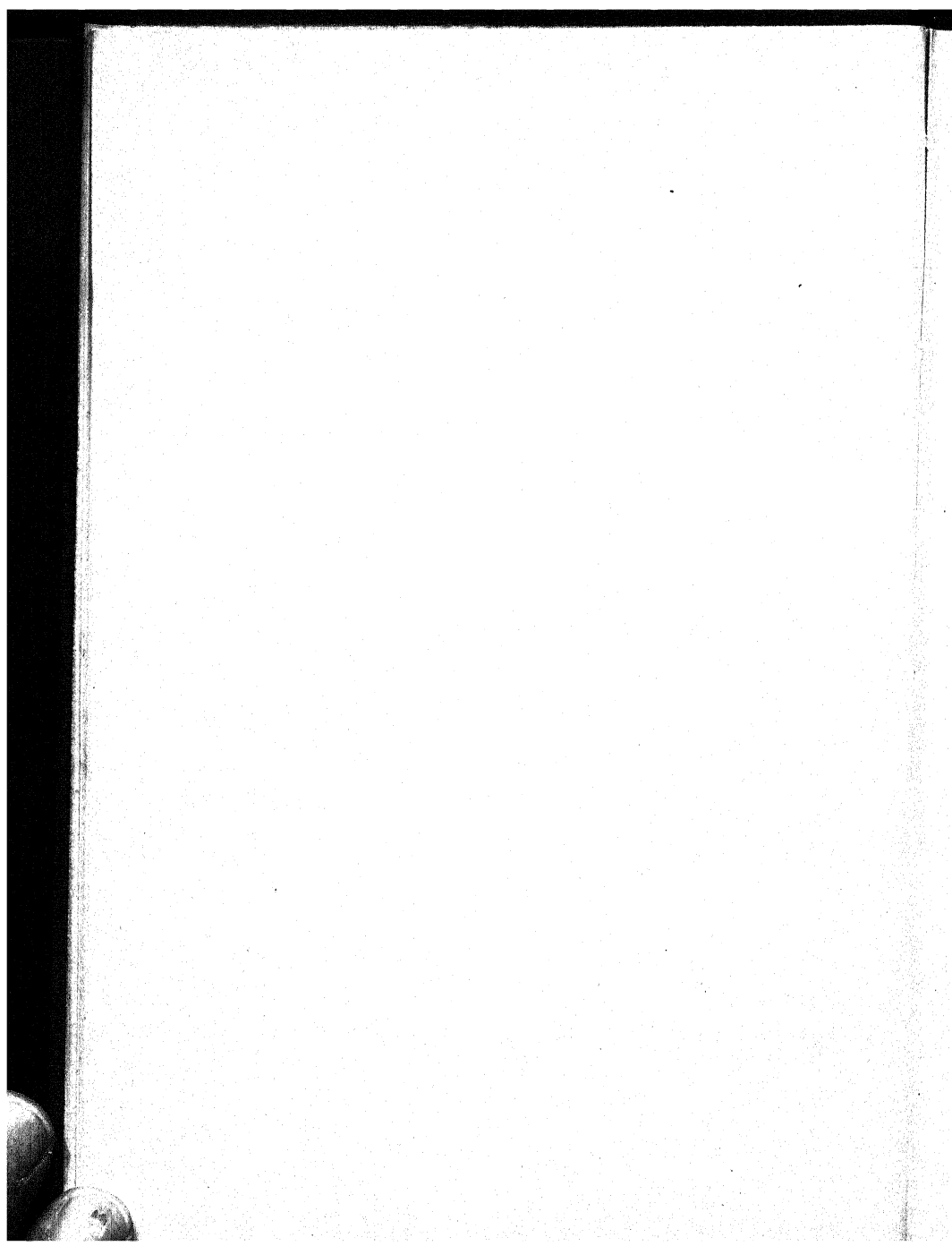
FUNDAMENTAL SITUATIONS AND PRACTICES

12. The First Class	97
13. Classroom Discipline	107
14. Classroom Equipment and Its Use	116
15. Providing for Individual Differences	129
16. Teaching Students How To Study	137
17. How To Make Drill Effective	145
18. Construction, Scoring, and Administration of Standardized Tests	155

19. Types, Use, and Choice of Standardized Tests .	164
20. Marks and Records	170
21. Special Practices in Industrial Training . . .	178
22. A Note on Teaching Foreign Languages . . .	188
Select Bibliography	199
Index	203

PART 1

The Principal Methods and Their Uses



1

The Good Teacher

The prime characteristics of a good teacher are interest in his students and knowledge of his subject. The prime characteristics of a good student are the desire and ability to learn. The art of teaching lies in selecting, organizing, and presenting what is to be learned in such a way that the student is inspired and helped to learn.

If the student does not learn, the teacher has not taught. If no one buys, there has been no sale.



Enthusiastic and alert.

Instructors must in every way try to improve their instruction. This book is designed to help them help themselves. It is based on extended observation, by an experienced teacher of teachers, of military and industrial war training programs. Every attempt has been made to confine it to advice which observation has shown is needed and practical.

A new instructor can do no better than to remember the best teacher he has ever had, and to try to analyze the qualities which made for his success. The chances are that the characteristics of this "best teacher" will be summed up in phrases like the following:

"He knew his subject."

"He made us work."

"He was the most enthusiastic man I ever knew."

"He had a talent for making things clear."

"He made us feel we were getting some place."

"He took us out and made us actually do what he'd been talking about and he worked right along with us himself."

Other characteristics of good teachers come to mind as we each think over our own education. Of one great teacher it is remembered that:

"He was never too busy to help a student with his work or a personal problem."

"He would always take time to listen."

"He had a lively sense of humor."

"He had a clear strong voice."

"He worked harder than we did."

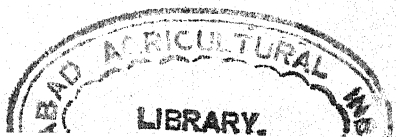
Teaching is hard work. It requires long hours of study and constant alertness. Class periods drain vitality. The teacher is like a battery with wires leading to each student. If they draw from him all they can, he is left with a feeling of exhaustion and needs time to rest and replenish.

Authorities in charge of war training programs are prone to ignore the burdens of teaching, and they often assign classroom hours as they would watches, drills, or shop supervision. Some men are being asked to instruct forty or more hours a week, in addition to taking their turn as officer of

the day, on the production line, or in other routine duties. Such schedules ignore the amount of outside work required for preparation, for follow-up in the way of reading papers and keeping records, and for conferences with students. A university professor who teaches one or two hours a day and has perhaps a total of seventy-five students, ordinarily works sixty or more hours a week. The heavier the assigned schedule, the poorer the teaching.

An overcrowded schedule means loss of the opportunity for more or less informal contacts of instructors with individual students. The loss is not only to the student and the teacher, but also to the country in the net results of war training. The instructor should make the welfare of his students his first concern. Having gained the confidence of his men, he soon finds that they depend upon him for guidance in personal problems, that they lean upon him for moral support. It is a mistake for teachers who might be setting a valuable example not to have time to practice what they preach. If the schedule does not provide time for private conferences with students, the instructor must make it his business to be available at least occasionally in the students' free time—after meals, during evening study hours, and over week ends. The added burden may be a social inconvenience, but it is a professional necessity.

Another time-consuming activity essential to good teaching is the continued study of one's own subject. No teacher ever knows all there is to know about his field. Constant study on the teacher's part may seem to carry him far beyond the point to which students may be expected to follow him. There are even some who say that the teacher who knows too much goes over the heads of his class. This does not follow.



Wide knowledge makes for wise selection. It also makes for enthusiasm. Knowledge and enthusiasm are good bases for every type of teaching.

Old knowledge never refreshed and never added to, soon grows stale. Stale knowledge is unpalatable. The good teacher does not offer his class stale knowledge any more than the good host gives his guests stale bread.

The new teacher does not need to wait to teach until he is an expert in his field. He may be just one jump ahead of his class, or even learning the subject along with them. But if he does not believe in what he is teaching sufficiently to learn all he can about it, he cannot expect students to want to learn it either. A bored teacher means bored students, and bored students do not learn.

The teacher's improvement of his own knowledge starts with study and restudy of the textbooks and reference books his students use. He then goes beyond the student to study authorities which the student may have neither the time nor the knowledge to consult. He keeps abreast of the new books in his field and reads regularly one or more of the magazines devoted to his subject. He talks shop with other teachers and experts. He listens to people who have had wide experience in his line of work. He tries to keep his own experience up to date by taking every opportunity to engage in practical work or research. He undertakes research in his specialty and tries to find better ways of doing things.

Time for reading and research is hard to find in the face of a full teaching schedule and the constant demands of other duties. It is, however, amazing what a careful analysis of disposable time reveals and how much can be done if a schedule allowing a regular minimum for personal study is followed.

There are, too, occasional extended periods which can be utilized. In a recent three-day train trip from New Orleans to Los Angeles it was possible to make a check on twenty-five army, navy, and marine officers who were taking the trip as casuals. Only two were engaged in any type of professional reading.

The ways a teacher can take to improve his methods of teaching closely parallel those he follows in improving his knowledge of his subject. He can study one of the many books written on principles and methods of education. He can take two or three educational periodicals. He can explore the science of psychology, the science of the mind, which might almost be called "the science of learning." He can talk the shop of teaching with his colleagues. He can visit their classes and classes in neighboring schools and colleges. He can invite visits to his own classroom from other teachers and his superiors and elicit criticism and suggestion.

The main means to the improvement of teaching, however, is the teacher's own continuing effort and frank self-criticism. No matter how great the teacher's knowledge, he must carefully prepare what he is to teach before he goes into the classroom. He must review daily what his students have actually learned to date and what more they can reasonably be expected to learn in the rest of the course. This review must be of students' learning and not just of the ground covered by the teacher. There must be a constant consideration of the success or failure of class meetings. What was good yesterday? Why? What went wrong? Why?

A good test of the teacher's attitude toward his work is his attitude toward the results of an examination. Does he blame a student's failure in an examination on the student or

on himself? Does he realize that where there has been a failure in learning, there has been a failure in teaching? Does he then try to analyze the causes of this failure and experiment with ways of correcting them?

The usual war training program offers an unusual opportunity for a teacher to improve his methods. The relative shortness of the courses allows experimentation with different methods of teaching the same subject matter. The practical nature of most of the courses allows realistic drill and a factual check on results. And the earnestness of the students places the burden of proof on the instructor.

Teaching is a profession. The teacher does not hold a job. The job holds the teacher.

2

A Preview of the Laws of Learning, Memory, and Forgetting

The good teacher organizes and presents his materials so as to provide the conditions under which the laws of learning and of memory function best. Common sense and experience will discover these for him, but he can speed up the process a great deal by studying a summary of these laws and analyzing his own classroom procedures in their light.

The laws of learning whose functioning the teacher should most strive to promote are five in number:

1. The learner must realize that he is faced with something to be learned. (Socrates was called the wisest man in the world because he knew he knew nothing.)

2. The learner must see the importance of learning and be determined to learn.

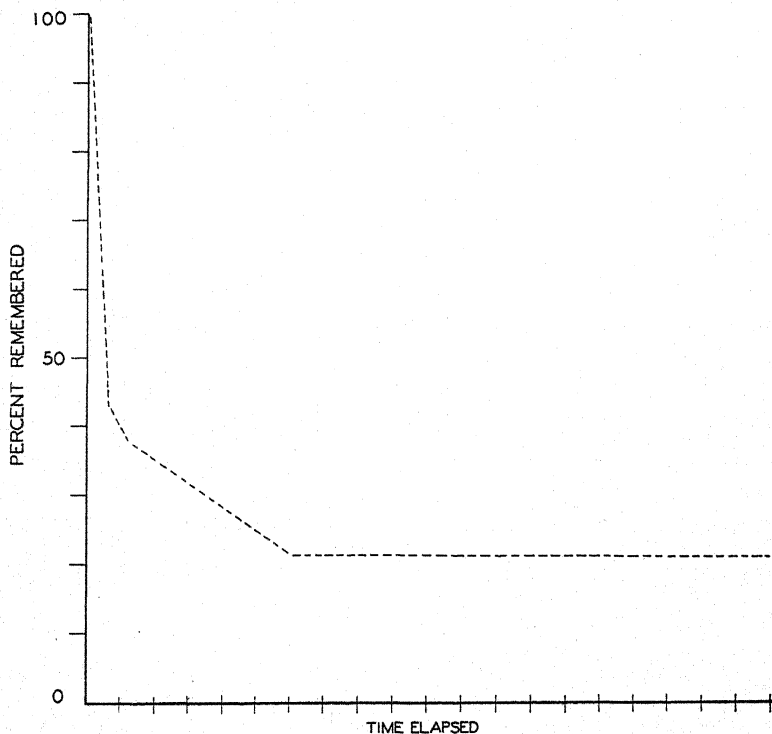
3. The learner must understand that which he is learning.

4. The learner must exert effort. He must drill on what he is learning and keep in mind the need to improve.

5. The learner must feel satisfaction in progress and achievement.

The laws of memory are closely kin to the laws of learning. The most important as bases for teaching methods are three in number:

1. Memory depends upon original mastery.
2. Memory depends upon the intensity of the original impression and upon recency.
3. Memory depends upon continued use.



The curve of forgetting (after Ebbinghaus).

The laws of forgetting are closely parallel with those of memory. The three most important for teachers are:

1. Forgotten are those things half learned because of lack of attention, of determination, of effort, or of understanding.

2. Forgotten are those things learned long ago, particularly if they were only half learned or were in themselves distasteful.

3. Forgotten are those things which are not used, particularly if they were learned under circumstances we should like to forget, or if they were only half learned long ago. These laws are cumulative, that is, we forget more quickly and more completely when they have all had a chance to function.

It must be realized that forgetting has a function in life. If every time action was required we remembered every pertinent thing we had ever learned or experienced, we should never get anything done. The moral is not to load teaching with insignificant detail.

Thoroughness of learning is a practical ideal for both students and their instructors. The more thoroughly a thing is learned the harder it is to forget it. Thoroughness, or, to use the psychological term, "overlearning," is generally the result of hard work. It comes when knowledge or a skill of any sort is first well understood and then used constantly either in drill or in practical applications. The value of overlearning can be shown by learning one set of, say, eight lines of verse just to the point where they can be repeated once without error. Then study another set of the same length and approximately the same difficulty and repeat them over and over again until they can be said without hesitation. A week later try to write out both poems. Much more of the one that was overlearned will be remembered.

A test of the laws of learning, memory, and forgetting is

readily provided by the teacher's own experience with the names of his students. Teachers fall into two types in this connection. One type says, "I have so many students and they change so often that I can't possibly remember their names. And what's the use, anyhow?" The better type says, "It is essential that I be able to call each of my students by name in and out of class. This makes it possible for me to connect the classwork of each man with his written work and so to help him more directly and to rate him more fairly. It pleases the student to know that I know his name and gives him a better attitude to me and my subject. After all, it can be no more difficult for me to learn a hundred new names in the first week than it is for a student to learn the hundred or more new terms I expect him to be able to use by then."

A teacher who realizes the importance of knowing his students' names accepts the challenge and exerts his best efforts to learn them. He studies the names in the typed class list. He pays strict attention to the pronunciation of each name and takes care to associate the name with the face and bearing of the student. He practices calling to mind the appearance of each. He makes an effort to recall the names of men as he sees them at formations, on the production line, and on the street. He may have a class photograph and drill himself on naming each person in it. He tries to hold a brief personal conference with each student and to find common friends and common interests. He takes pride in being one of those who do learn and remember names. He is careful to use the student's name in speaking to him in and out of the classroom.

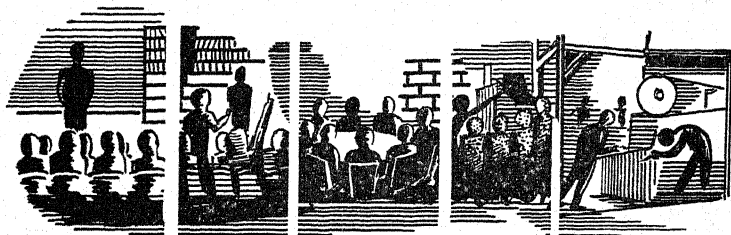
Names once learned are easily remembered from day to

day as long as we keep regular contacts with the individuals and speak to them by name. They are easily forgotten if they have been known only a short time, if there is no longer any purpose in remembering them, and if the owner has not been seen recently, particularly if we have not even thought of him in the interval.

Another example of the laws of learning is provided by the common experience of teachers that the best way to learn a subject is to teach it. The teacher knows that to teach he must learn. He exerts himself to learn and to understand. He carries understanding to the point of being able to explain the how, why, and where to others. He probably teaches the same thing over and over again. And if he is a true teacher he feels satisfaction in imparting his knowledge.

Choice of a Method

The common methods of group instruction are lecture, recitation, discussion, demonstration, and laboratory. Methods are not exclusive. A period which begins with a lecture may very well see the utilization of several other methods before its close. One of the mistakes new teachers often make is to plan the work of a period or even of a course as if there were only one method in the world. A change of method within a period may be helpful just because it is a change, for change is one means of preventing attention from flagging.



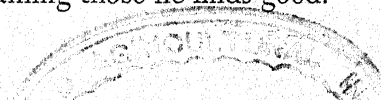
Common methods of teaching: lecture, recitation, discussion, demonstration, laboratory.

Choice of method depends upon the purpose of a particular lesson. One convenient analysis divides all lessons into four types: the development or presentation of new facts and processes to be mastered; drill on facts already understood which must be memorized for future use; review of old facts in new relations; and appreciation or enjoyment of the use of old or new knowledge.

Other factors in the choice of a method are: the amount of time available; the preference of the instructor for one type or another; any preference the class may have; the comparative ability of the class to learn by different methods; the availability of equipment, supplies, books, and other sources of information; the opportunities for practice; and the need of a change to enliven a period or a course.

The teacher's own personality modifies any method he may choose, but he should try not to allow his own preference or convenience to militate against the best interests of the class as a whole or of individuals in the class. He must keep a constant check on the attention which the students pay and the amount which they seem to learn. If they are sleepy, the fault is generally not theirs but the teacher's. It is likewise his fault if many of them fail to learn. A teacher cannot make the success or failure of students in examinations his sole measure of success in teaching. A good examination mark may be due to past training or last-minute study of the text. Better clues to how one is teaching are found in the alertness of the students, in the questions they ask, in the comments they make, and in the independent reading they undertake. When the teacher has reason to feel that students are not learning, one of his first steps should be to reconsider his choice of a method.

Teaching is an individual matter just as learning is. Each teacher develops his own style. It is not the purpose of this book to force a teacher into a common mold. That would only result in breakage. All that can be done is to point out some of the possibilities in method, some of the common devices, and some common errors. The wide-awake teacher will try to work out his own most effective method by putting new ideas to practical test and retaining those he finds good.



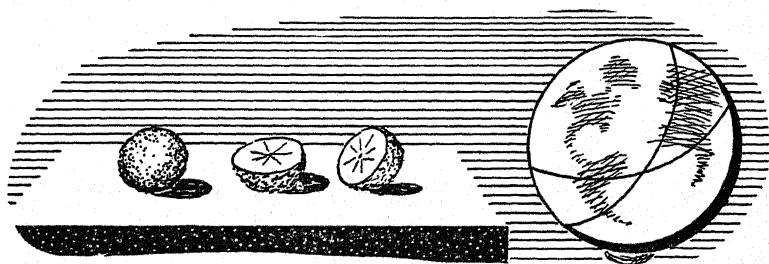
The Lecture

The lecture has been defined by a student as the method "where the teacher does all of the talking." It can be one of the best ways of instruction. It is frequently one of the worst. To be a good lecturer requires unusual knowledge and special abilities.

The advantages of the lecture are most evident when a group is being introduced to new subject matter. The instructor who knows his men and knows his subject, is able to bring them together better than most textbooks. He can select materials which the group will immediately recognize as important to them in their work, and thus provide sound motivation for their continued learning. He will also be able to present facts having that appeal of novelty which is one of the main provokers of interest. Above all, he can promote understanding by building new knowledge on the knowledge he knows his students already have.

The value of the lecture in introducing a new subject can be illustrated by the way one skillful instructor starts his first classes in navigation. The text used in the course, like many in the subject, begins with a series of definitions worded in mathematical terms. For example, "The *Equator* is the great circle formed by the intersection with the earth's surface of a plane perpendicular to the axis; the equator is equidistant

from the poles, every point of it being 90 degrees from each pole." This instructor, aware that the book does not define "great circle" until twenty definitions later, and that most members of the group already have an idea of what the equator means, starts out by comparing the earth with an orange. He takes an orange into the room and cuts it in half before the class. He can then use their knowledge of the equator and of oranges to give them an understanding of "great circle" and of the comparative shortness of great circle routes—matters which experience has shown him are difficult for most novices in navigation to grasp. Interest is stirred by pointing out that the highest mountain in the earth makes comparatively far less of a bump on the earth's surface than do the slight irregularities on the surface of an orange.



First the orange, then the globe.

Lectures are also useful when appropriate texts are not available. It often happens that all texts in print are too hard or too easy for a class, or that new discoveries or new conditions have put them out of date. Under these circumstances it is better for the instructor with command of his subject to lecture to the class on the information they need than to

have them study a poor text. He can require that they take notes and that they study these notes out of class. In this way the dangers inherent in studying misinformation can be avoided and the whole process of presenting essential materials greatly speeded up. Similarly, the lecture is an excellent way to present the points of view of various authorities in a subject when these happen to differ and the class either has not access to source materials or does not have time to utilize them.

The lecture is a wise substitute for a book when the men in the class are not good readers. In this case the lecturer must be careful to avoid the elements which make reading difficult—unknown words, long sentences, and assumption of knowledge or understanding. There will always be men who are literate but nevertheless learn more of what they hear than of what they read. For these men and to some extent for everyone, the lecture gives life to a subject by injecting the teacher's personality into it.

The contents of a lecture, even if they are delimited by a prescribed course outline, require meticulous preparation and organization. A good way to start is to *write down* the main objective for the day. What is it that you most want your students to learn in the period? Ask yourself these questions: (1) How is this objective related to that of the whole course? (2) How is it connected with what has gone before? Do all of the students have the knowledge prerequisite to understanding? (3) How is it related to particular objectives of lectures which are to follow? (4) What textbooks and reference books are students expected to study in connection with preparation for the lecture or ultimately in review? (5) What are the best authorities on the topic?

Notes taken by the instructor are an essential part of his preparation. He may not use them during his lecture, but he will certainly want them when it comes to selecting and organizing his materials for presentation. It does not do to trust to memory. The brilliant Oliver Wendell Holmes is author of the statement, "The trouble with winged thoughts is that they so often take wing."

The instructor's preparatory reading should start with the books which the students may be expected to have read before they come to class. These books must be examined no matter how elementary they may be. The purpose here is not to detail back to the class what they have already read, though it must be confessed that some lecturers seem to be reciting the lesson to the class instead of vice versa. The purpose is to select matters which require further explanation or emphasis for the benefit of the whole class or of certain individuals, e.g., new words, statements which are open to misinterpretation or are actually wrong, and points which it is most important for the student to remember for future use.

Anecdotes, personal experiences, and striking illustrations will occur to the instructor during his reading. Note should be made of each of these so that the most desirable can be selected later.

References to specific passages or to whole articles and books of which mention may be made in class should be written down. If these references are made full and accurate, much time will be saved. In the case of passages from books it is good practice to slip pieces of paper in as bookmarks and even, if the book is the personal property of the instructor, to draw a light pencil mark in the margin by the passage in

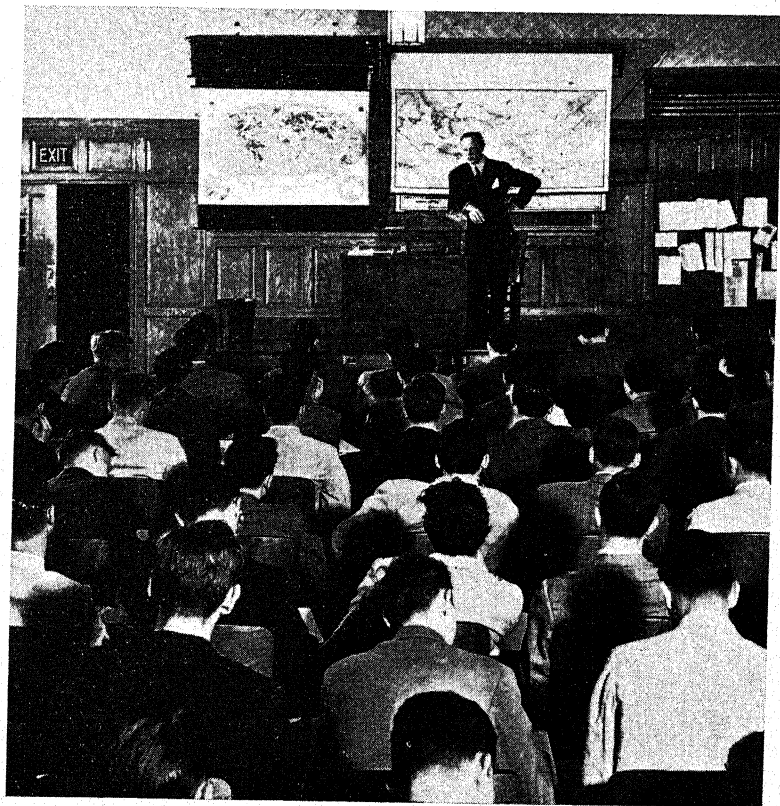
question. Later the bookmarks in those passages to be used can be numbered so that they can readily be found in the classroom.

Selection of materials is governed by the objectives of the course, the objective of the period, the ability and knowledge of the class, and the time available. Most of these are matters of common sense. A frequent mistake of beginning instructors is to include too much because they fear that they will run out of ideas and be left speechless in class. This is a natural fear but it can be controlled by always having extra tasks ready for the students to do. The most simple of these is assigned reading in a text, even the study during what is left of the class period of the assignment for next time. Other refuges include an examination on the day's lecture, an examination on general knowledge, any type of written work, and shifts in technique, e.g., to a discussion.

A display of great erudition is another danger in the lecture, one to which not only the novice is liable. Professor John Berdan, one of Yale's great teachers, used to describe one of his colleagues: "He makes a great splurge. It's like holding a narrow-necked bottle under the tap and turning the water on full force. There is a lot of display and excitement, but very little water runs into the bottle." Of another, he said, "His knowledge seems to flow in just a trickle, but at the end of the hour the bottle is full. And remember, the Yale undergraduate has a very small neck."

The needs of different individuals in a class should not be ignored when selecting material to be included in a lecture. If the instructor knows that, to understand a point, a certain student needs information more detailed than that needed by others in the class, he should try to include this. At least,

if he is not willing to write off the man as a failure before he has started, he should plan to give the individual a reference in which he can find the help he needs. Individuals' opinions can sometimes be more strongly influenced in the course of a general lecture than in a private conference. A challenge



The lecture: a class of the late Nicholas J. Spykman. (*Life Photo* by John Phillips)

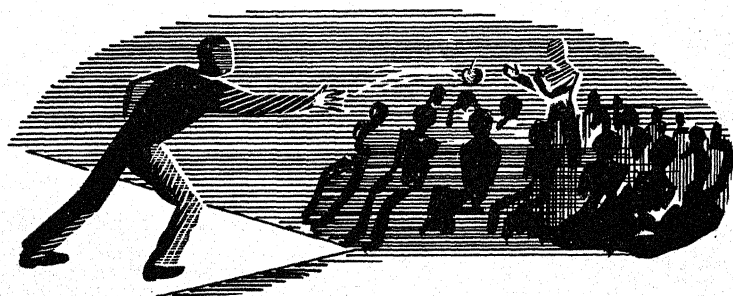
of a student's opinion in a conference may put the student on the defensive and cause him to adhere to his idea even more closely. The lecture, however, may lead him to adopt the instructor's view. In a way it carries authority like that of the printed word, and people's willingness to believe what they see in a newspaper is proverbial.

The organization of a lecture must allow for the limitations inherent in audiences. It takes time for a class or any other audience to warm up to a subject and to concentrate on it. This makes it wise to start with a review or with an anecdote or two connected with the subject of the lecture but not necessary for its understanding. The tradition by which the public speaker starts by telling a funny story to catch his audience's attention is a good one, but an instructor who follows this tradition must be very sure that his story will appeal to the students and that it has a point connected with the lecture. Early in the lecture special care must be taken to motivate the hearers' desire to listen and learn. Anecdotes contribute to this because they catch interest. If they are exciting they add to the intensity of the first impression and so promote memory. Anecdotes often show how the lecture is related to future needs of members of the class. This relation must be explained in enough detail to be understood. A mere statement that "This is of considerable importance" is not enough.

Sustained attention is promoted by a desire to learn or by any form of suspense. For example, many superior lecturers make a practice of putting an outline of their lecture on the board before class. They start by asking the class to read the outline, with the result that as the lecture progresses the class is watching for each new point. This system also avoids

the wrong type of suspense—that of wondering when the lecture will end. It has the added advantage of providing organization for the students' notes.

Some talented instructors have a style which gives their lectures the fascination of a short story. Only a few of us can reach this level, but all of us should bear in mind the eagerness with which stories are heard or read, and try in our lectures to emulate the writer of fiction in suspense, logical development, pace, and humor. Logical development is more dependent on hard work by the instructor and less on his native talents than pace and humor. But logic, though easy to advise, is hard to describe. One underlying principle is that new knowledge should be based on old understand-



Something to catch and take away.

ing. It is foolish to define the equator in terms of a great circle rather than vice versa. Another underlying principle is to present the generalization first and the particulars later. A lecture on logistics begins better by a citation of Napoleon's maxim "An army moves on its stomach" than by a discussion of the various forms of transport now in use. Inde-

pendent details result in failure to see the wood because of the trees.

The body of a lecture may pivot around one idea or take up several. In either case the instructor must be sure that he makes his points. He cannot count on his students' abilities as mind readers nor yet upon their skill in deduction. An old preacher summed up the wisdom of making concrete points by saying, "I think of myself as standing in the pulpit and tossing apples first to one member of the congregation and then to another. I must give them something they can catch and take away with them."

A lecture should be organized to include and allow time for a summary of the points which have been made. This helps to bring them in relation to each other and into proportion. It also increases the likelihood that students will remember and apply what they have heard. It is a good habit to enumerate the points covered by a lecture both near the beginning and in the summary. This summary is advisable even when the lecturer follows the praiseworthy habit of beginning each period with a review of the previous lecture. Repetition in brief does no harm.

A reference to the subject matter of the next lecture in a series is an excellent conclusion. It starts students' minds thinking along the desired lines and makes them more receptive when the time comes. It thus strengthens the opening and closing summaries as links in the chain of understanding and memory.

A question period at the close of a lecture is provided by many good lecturers. This allows the students a chance to clear up doubtful points, and the quality of the questions gives the lecturer a rough measure of the students' under-

standing and interest. Lack of questions does not guarantee understanding, nor, on the other hand, does it necessarily imply lack of interest. It takes tact on the part of the instructor and experience on the part of the students to develop good question periods. This is particularly true when there are large classes. Some schedules avoid this difficulty by scheduling lectures and quiz sections separately. The lecture group includes the quiz sections, which meet all together to be lectured to by the best-qualified instructor. The quiz sections then meet separately under other instructors for questioning and for discussion.

How much of a lecture should be written down during preparation and in what form? Excellent lecturers have been found to differ greatly in this respect. A very few actually write out their lecture word for word and memorize it. Others, with good memories, write down nothing after they have finished their notes but arrange the main headings mentally. Others write down the main heads only. Still others write out a full outline with main heads and subheads. A few of the best write out in final sentence form a few of their main points. Practically all make a practice of counting main heads or main points and using the number as a guard against omission. The advance assignment, new words, references to books, and in general anything to be written on the blackboard, are written out accurately and in detail.

The beginner, on the whole, should not memorize his lecture. The fear of forgetting it is just an added factor in nervousness. Perhaps he will find it wise to make an outline of heads and subheads, and to write out a few key sentences. Often he will find that he does not have to refer to his notes in class at all, but it is nonetheless a comfort to have them

there in case of need. Nor need he be embarrassed if at any time he has to say, "Let me look at my notes and be sure that I have said everything I meant to say about that." Of course, if the outline has been put on the board in advance, the instructor as well as the students can use it.

Accurate timing is a problem for any lecturer, no matter how experienced he may be. It is true that men who have taught for years have a subconscious alarm that wakes them up when fifty minutes have passed. Some college teachers are even said to take fifty minutes to answer their wives' questions. The younger man will have to learn to keep an eye unostentatiously on the clock or on his watch and to speed up or coalesce, to slow down or spread out, as the occasion demands.

It is far better to cut a period short than to run over. The students of a man who habitually runs over his time begin to look for the end of the hour long before it comes and so miss much more than he is able to give them in the extra minutes he steals. His colleagues, disturbed by the late entrance of students coming from his classes, damage matters still further by voicing their resentment. A rule of thumb is always to plan to save ten minutes at the end of the period for the summary. Some instructors plan to give out the advance assignment at this time, but it is safer to have this written on the board before the class starts.

Fifty minutes is almost the outside limit of time for a class to listen to a lecture with profit. Men and schedule-makers who insist on lectures of two hours or longer are wasting the instructors' time as well as the students'. They are covering ground without getting anyone anywhere. If a lecture must stretch over a long period, some kind of break

must be provided at intervals of forty to forty-five minutes. Breaks usually take the form of a five-minute intermission during which windows are opened and the men allowed to relax. A brief warming-up period is necessary after every break. Other breaks can be provided by occasional discussions, written work, or periods of study.

The manner of delivery of a lecture makes all of the difference in the world in the students' attention and learning. The man who writes down what he has to say and reads it in a monotone has almost the poorest delivery. His nearest rival is the man who has memorized what he has to say and amuses the class by having his mind go blank. Other common sins of delivery include turning one's back to the class, inaudibility, incorrect pronunciation, speaking too fast or too slow, unfinished sentences, mannerisms like beginning every sentence with "Well," and a scolding tone of voice. Desirable in delivery are clarity, sufficient volume to reach the back row with a safe margin, a variation in pitch and volume, natural gestures, animation, and humor.

Good delivery is not necessarily a gift. It can be acquired by study and practice. At first the novice will feel self-conscious as he deliberately varies his voice, uses gestures, and puts on something of an act for the class. Experience helps him overcome this, and the process can be greatly speeded up by watching good lecturers and noting how unconscious the audience seems of both changes in pitch and of gestures. In fact, a man who stands still on the platform like a wooden Indian is far more distracting than one who occasionally pounds his hand with his fist.

The lecture, more than any other method of instruction, must be checked for effectiveness because teachers do all

the talking. The teacher should constantly watch the faces of his hearers. He cannot tell what the wide-awake man is dreaming about, but he can spot instantly those who nod or go to sleep, those who keep looking at their watches, and those who call their companions' attention to the pigeons on the window sill. Remember that lack of attention is the teacher's fault, more than the students'.

Industrious note-taking by the students is a good sign, and what the notes contain is an excellent criterion of attention and understanding. It is a good idea to arrange to collect notebooks at the end of an hour and see what the students have put down. Do not be surprised if the most prolific-seeming note-taker turns in empty pages. Vassar girls have been known to have personal note paper punched to fit their loose-leaf books.

Intelligent questions during the discussion period or after class are another indication of success. Here again the cynic is on his guard. Students are sometimes clever enough to question themselves into the good graces of an instructor with far less effort than study would have taken. The role can be reversed and questions asked in return. In fact, a good self-examination for a lecturer is to give the students a test on his lecture in the last ten minutes of the period.

5

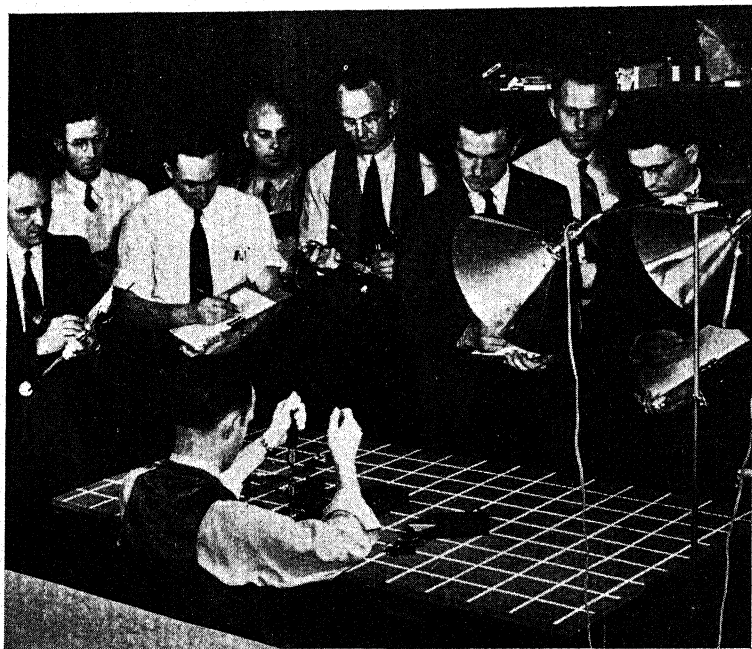
The Demonstration

"Demonstration" is taken to mean any explanation by the teacher of apparatus, principles, or processes which is accompanied by a concrete exhibition. It covers, for example, taking a compass into the class so that the class can see what it looks like, or to prove to them the effect on the compass of moving a piece of steel in its neighborhood, or to illustrate its use in steering a course. Technically, demonstration includes the use of motion pictures, but in this book these will be considered under a separate chapter on "Visual Education."

The demonstration is well used to illustrate a lecture. In the laboratory it serves to instruct students in techniques they are about to need. It finds some place in all other methods, and, though it profits from meticulous preparation, the alert teacher will often be inspired to give a spur-of-the-moment demonstration which will clear up unexpected difficulties or stimulate flagging interest. In connection with all methods, the demonstration may serve to give a visible proof of a theory or to set a standard of performance. In connection with a drill period, it provides a model before the drill and an effective means of correction during drill. When sufficient equipment to allow each individual separate practice is not available, repeated demonstrations may provide a

good substitute. In fact, there is good evidence to believe that students remember and apply many matters they have learned from demonstrations alone, better than other students who have learned the same matters through the laboratory method. Obviously, when this is true, the demonstration is a great saver of time and money.

Preparation for a demonstration includes assembling the materials, wording the explanation, rehearsing the action, making ready the classroom, and a final check of materials



Class in time-and-motion study. An engineering defense training program for workmen. (*Life Photo* by John Phillips)

before the class starts. These seem obvious steps, but years spent in observing teachers have led to the conviction that demonstrations are rarely completely prepared. Most of us have suffered from sitting idle while a demonstrator fussed with his apparatus or went to fetch a missing part. A few of us have ourselves been guilty of staging demonstrations which did not quite come off and know the sense of futility with which we explained what should have happened.

The class which has to wait while a demonstrator prepares his apparatus, or places drawings on the board, not only loses time but interest as well. The wait is worse, because more prolonged, than that while a lecturer fumbles through his notes or tries to find a reference in a book. A two-minute delay for a class of thirty is an hour lost. Then, if the instructor takes time to bring their minds back to the matter in hand, another hour is lost. If he does not, the rest of the period is lost thirty times over.

A check list of materials written down when one is thinking out a demonstration and corrected during the rehearsal is the sure first step in preventing delay. Everyone can and should prepare such a list. The second step is to make everything ready in the classroom before the class arrives and to check this against the list. Sometimes the second step is impossible either because the classroom is not free before the demonstration or because the instructor is not free, or both.

When it is necessary for the instructor to take time out of the class period to set up a demonstration, he should have some task which he can require the class to do during that time, however short he expects it to be. They can be asked to write answers to questions on the lesson, to write down accounts of experiences they have had in line with the matter

to be demonstrated, or they can even be told to read about it in their texts. The fill-in task should be definite, not just a vague "Keep quiet and find something to do" or "Be thinking about this problem." Even if the assigned task takes more time than the instructor needs, it is time saved.

The explanations which accompany demonstrations are miniature lectures and deserve the type of preparation a full lecture receives. A demonstration fixes terminology in students' minds better than almost any other device because it establishes a direct association of the name with the object. The parts to be named should be listed in the teacher's notes and he should plan to use the names over and over again during the class period. They should be written on the board before class or in class when they are first used. Assurance is made doubly sure if the instructor spells each term orally. Analogies with knowledge already possessed by students and similarities to apparatus with which they are familiar always make explanations more clear. A student recently recruited from a farm once had the advantage of three-point suspension of a motor made clear to him by comparison with a three-legged milking stool. Theories are best explained by both positive and negative demonstrations. For example, magnetism and the effect of steel upon the lines of force can be shown by moving first a knife and then a fountain pen through the field. Humor and a dramatic air enhance interest. A skillful instructor in psychology has been known to demonstrate optical illusions with an accompanying talk suspiciously reminiscent of the patter of the shell-and-pea man at a county fair: "Now you see it. Now you don't."

Two questions should be in the instructor's mind at the start of every demonstration. Can everyone hear? Can every-

one see? Hearing is a matter of acoustics and of the teacher's voice. These are as much a factor in demonstrations as in lectures.

Visibility is an absolute need of all demonstrations. A recent magazine has a picture on its cover of an instructor at the Naval Academy demonstrating a ship model to a class. The class is so crowded around him that only those standing in the front row can see the model. And the students in the back row have obviously lost interest. Crowding around the demonstrator is a frequent occurrence. It can be easily corrected by having the students stand or sit in a U and staging the demonstration in the open end.

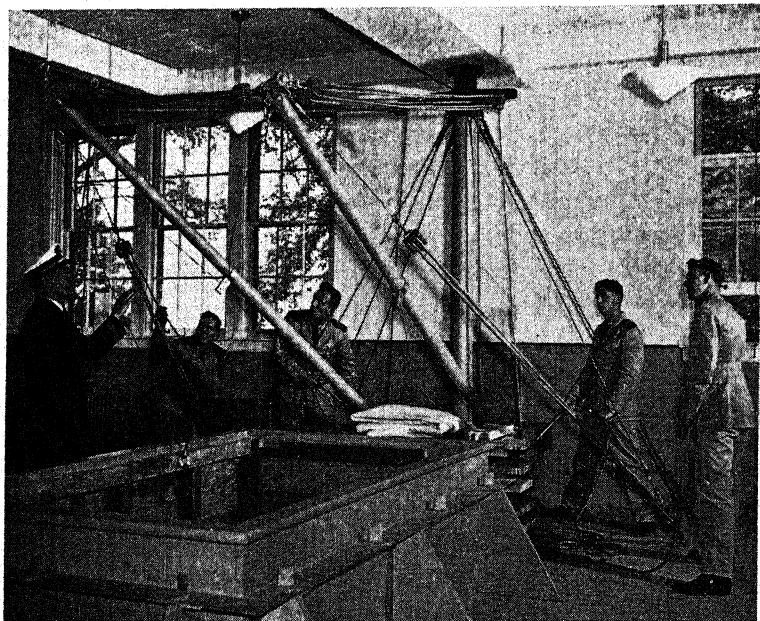
Another cause of poor visibility lies in the common arrangement of classrooms with the teacher's desk and the students' desks on the same level, with the latter lined up in regular rows. Under these circumstances a few of the students in the front row can see but the others have their view blocked by the angle and by their fellows' heads. If the students' chairs are movable, this can be corrected by having them arranged like a U. If they are not, the students in the back and side rows can be asked to stand, or if the materials are such that they can be held up, the instructor can stand and hold them high enough for everyone to see. A lecture hall in which demonstrations are likely to be frequent should have its seats arranged in tiers like the stands at a football field.

A large piece of apparatus which can be moved only with difficulty is often placed on a pedestal too high to permit a good general view of it. For example, it is common to see motors of various types mounted so that only those next to the instructor can see the valves or anything on the motor

head. When a motor is regularly used for demonstration purposes, it is worth the trouble and the space needed to build a platform or even a saucer-shaped tier of steps around it.

The teacher should always ask before he starts a demonstration, "Can everyone see?" And he does well to ask again after a few minutes, "Can everyone see and hear?"

Teachers sometimes try to ensure each student a good view of an object or of a picture by passing it around the class. They are likely to continue talking or asking questions



Model hatch and cargo gear used for demonstrations. (Courtesy
United States Merchant Marine Cadet Corps.)

while the object circulates. This is a bad habit. The student either looks at the object and misses the lecture, or listens to the lecture and secures no better understanding of the object. The former is more often the case, and the loss is aggravated by a tendency to watch to see when one's own turn is coming and later to gauge the reaction of one's friends. If a teacher could visit another teacher's class when a picture or piece of machinery is circulated in this way, he would never make the mistake again himself. Objects which the instructor wishes the students to handle should be passed around in time reserved for that purpose. The teacher himself can take the object from group to group or person to person and point out special features. Or the class can be given a study period so that those not actually handling the apparatus can keep themselves busy. When there is time after class the object can be left on the teacher's desk so that those who are interested can get a closer look.

An immediate check on the effectiveness of a demonstration is afforded by the type of question students ask. Intelligent questions are a sign of interest and of learning. If no questions are asked, this may be due to complete understanding but is more likely to be due to lack of understanding or lack of interest. Another valuable check is to ask one or more of the students to repeat the demonstration before the class. This lets the instructor see whether he has been understood. The repetition serves to fix in the students' minds the matter demonstrated. The student who conducts the demonstration is likely to make any mistakes which are common in the circumstances. This allows the instructor to apply an immediate correction and so to save time and trouble in the future.

6

The Recitation

The recitation is generally understood to be the method by which the teacher asks the students questions on a prepared assignment. It has been so prevalent in schools and colleges that "recitation" has become a generic term for a class period regardless of the method employed. It is easily abused, but, properly conducted, it merits the place it holds.

The recitation at its low ebb is illustrated by the old-fashioned spelling lesson. The students were supposed to study a list of words. Then they were told to close their books. The teacher kept her book open on the desk in front of her. Looking over her glasses, she called upon the students in alphabetical order to rise and spell. Inasmuch as the words were also given in alphabetical order, the bright boy whose name began with A studied only the first word in the list, rattled it off when called upon, received a 100 for his performance, and spent the rest of the period dreaming of Spring and the old swimming hole.

The properly conducted recitation bears little resemblance to this spelling lesson. Its possibilities are evident in the popular radio program "Information, Please!" It may be concerned not only with a textbook assignment, but also with the student's general knowledge or with experiences in and out of the line of formal education. The teacher feels free to

comment and explain when lack of understanding is evident. Students with problems have a chance to ask questions. Students with special knowledge have a chance to contribute this in comments of their own. The backbone of the period is still made up of questions and answers, but there is a tendency to a controlled discussion.



A recitation: "Information, Please!" (Courtesy *National Broadcasting Company*)

The merits of the recitation include the stimulus the system gives to preparation of an assignment. A written test of the objective type is the most efficient probe of the extent and thoroughness of a student's preparation, but many a student who does not mind turning in a blank sheet of paper on an examination is unwilling to parade his ignorance before his classmates. Oral answers in this way promote a healthy competition.

Mistakes in an oral recitation are subject to immediate

correction. This has the minor advantage of saving the teacher time and labor in writing out detailed corrections on examination papers. It has the major advantage of giving the student, while his mind is still on the problem, a contrast of right with wrong. This combination increases the probability that he will remember the right. His interest is awake, which is in itself a tremendous help to learning. Experiments have shown that mistakes are eliminated more quickly and with less chance of recurrence when a student can see his wrong answer exhibited side by side with the right answer. A simple example of a type often met in learning tables of any kind, is found in teaching arithmetic. A student says or writes, " $7 \times 8 = 54$." The teacher writes on the board and reads out the words as he writes them: "No. 7×8 is not 54. $7 \times 8 = 56$." A mnemonic to avoid a common spelling mistake depends in part on the same principle: "A~~right~~ is all wrong. All wrong is all right."

Answering a question in one's own words is an aid to memory. The form of the answer gives a clue to the extent of the student's understanding. If instead of using his own words he parrots the text or the teacher, he can be immediately questioned further. If it turns out that his knowledge is just superficial, if lack of understanding is evident, the teacher can give whatever explanations and examples may be necessary. It is surprising how often a whole class of even mature students will, if left alone, content themselves with the ability to parrot.

The questions the teacher asks in a recitation are a means of placing a desirable emphasis on the most important points in a lesson. Answering the questions drills the student, and to a less extent his student audience, on these points. More-

over, the teacher's questions and comments can show the relationship between old and new knowledge, and how they both will serve future needs of the students. The students, in their answers, have the chance to use personal experience as illustrations, and the added associations help memory.

The recitation can require students to apply their knowledge to a range of problems and situations far beyond the scope of the laboratory experiments or practical field work possible in most training courses. In this it is like the essay type of examination but it is far more flexible. It also has the advantage of allowing a give and take of criticism.

The question is obviously the essence of the recitation method. The fulfillment of the possibilities detailed above depends primarily on the skill with which questions are worded and the technique which the teacher uses in presenting them to the class. Yet it is safe to say that no aspect of daily preparation is as much neglected by teachers as that of formulating questions for specific purposes and working out the probable effects on the learning of individual students and of the whole class. Many a teacher slaves over reviewing the subject matter of an assignment only to be puzzled and hurt by the general lack of attention the students pay during the recitation. The chances are that he has not thought out the techniques of questioning even though most of these seem self-evident.

Obvious requirements in all questions are that they be clearly worded and that they require no knowledge of terms or facts not already studied by the student. They should be planned to achieve or at least lead to the achievement of definite objectives. They should be brief enough for the student to remember them clearly and capable of a definitive

answer in a brief time. A question which can be answered by a simple "yes" or "no" is usually to be avoided. It encourages too much guesswork. Wording should be examined to be sure that it does not give away the answer. Most questions with a negative in them fall in this class. "Was it not Scipio who invented the pincers movement?" "Yes."

Testing the student's knowledge, particularly his knowledge of the day's lesson, is the common objective of the questions most teachers ask in class. This in itself is a legitimate objective, but, if it is allowed to stand alone, great opportunities are being lost. Questions must be designed to the specific ends of correcting mistakes, promoting understanding, increasing personal associations, and paving the way for practical use if these ends are eventually to be achieved.

Two broad types of questions are easily distinguished. Either can be used in connection with any objective though one or the other often seems more appropriate. The first general type is that which asks the student to recall and recite facts. It asks the questions: Who? What? Where? Other words used include: name, state, tell, select, summarize. Recall-of-fact questions at first glance seem fitted only to examine a student on his knowledge. A series of them, however, may lead a student to understanding. And the questions can be worded to test his understanding. "What atmospheric conditions exist in San Francisco which do not occur over the Mojave Desert?"

Questions which require application of one's knowledge constitute the second type. These are questions which ask, How? Why? They are often in the form of directions rather than questions and use words like compare, interpret, analyze, apply the principles of, solve, discuss, give your opinion

of, evaluate. They test the student's discrimination and understanding and give him practice in applying what he knows in order to arrive at conclusions and to make decisions.

The teacher's preparation of questions for use in class should be deliberate. To count on following a line of questioning with inspiration providing the words is dangerous slackness. Six steps are always involved. First, the teacher must have clearly in mind the immediate and ultimate objectives of the assignment. Second, he must, in the light of the objectives, determine the most important points in the assignment. Third, he must consider where misunderstanding is most likely. Fourth, he must word questions which concern the important points in such a way as to promote understanding or disclose misunderstanding. Fifth, he must consider in what order to place his questions. Sixth, he must fit his questions to individuals and give himself a mental rehearsal of the probable course of the recitation.

These requirements for preparation seem complicated and they do involve a great deal of work. Many teachers neglect them, but the best teachers conscientiously go through each step. The steps are made easier by jotting down ideas for questions while reviewing the assignment. The objectives, the important points, and the way one question leads to another may well follow the outline of a satisfactory textbook. Allocating questions to individuals is helped by running through the class list as a final piece of preparation. The teacher who knows his class will be quick to remember what students are weak in certain matters and need the practice which answering a given question will provide. Other students may be customarily careless in looking up new words in the dictionary and so be in line for questions on terminol-

ogy. Others may have had practical experiences which they can be asked to describe as added illustrations for the class. Others may need self-confidence and so the opportunity to show off special knowledge or abilities.

The actual recitation period will cause changes in the teacher's best-laid plans. Facts like student absences or an individual's lack of preparation will inevitably be encountered. Sometimes the course of the recitation will open up new leads which must be followed despite the seeming loss of labor. These probabilities are not a reason for failure to prepare questions in advance. It is much easier to run a campaign on a new line if the ammunition is on hand than if the troops have to mark time until it is brought up.

The recitation, like any other class period, proceeds better if provision is made for "warming up." Warming up may employ the standard processes of a review by the teacher of the last period, the retailing of a pertinent anecdote, or the showing of a pertinent movie or set of still pictures. One good procedure is to ask the students what questions they have as a result of their preparation and to list these on the blackboard. Then the questioning of the students can be woven around these so that individuals suddenly find themselves able to answer their own questions.

Setting a problem which requires the application of the students' knowledge is an excellent way to start a recitation. The problem may be one which comes up frequently in practical situations, one found in the current news, or a hypothetical problem made up by the instructor to set the stage for the day. For example, an instructor in a lifesaving course can describe the crash of a plane at sea and pretend in his description that actual members of his class are members of

the plane's crew. Then he can ask them by name, "What would you do first, Mr. ——?" "Next?" "What would you be doing in the meantime, Mr. ——?"

Vividness and energy on the instructor's part are essential during the warming-up period of a recitation and throughout all of the time he is asking questions. An instructor's force communicates itself in a mysterious way to a class and keeps them actively participating. On the other hand, an instructor who asks questions in a lackadaisical manner soon loses the attention of everyone except the student who is on the spot. A good start can be made by employing comic exaggeration in setting the stage. The plane should not be just a plane, but a crimson plane plummeting into an azure sea. The smallest man in the class is named as captain, the biggest as mascot, and the instructor as steward.

Questions aimed at drill should be given with snap, and snap required in answers. Devices to pep up the period should not be scorned. Sometimes it is possible to frame a series of questions to which the answers should be given with the rapidity of a group of soldiers counting off. Make the class stand, ask the questions in rapid-fire order, let the man who answers correctly sit down, but pass the man who hesitates and leave him standing. It needs no comment from the instructor to be sure that the last one up will be better prepared next time.

Questions requiring thought-out application of knowledge should be given seriously, and, on occasion, the students all made to think in silence for a full minute by the clock before one is called upon for the answer. The dramatic quality of a minute's silence is intense, and the marshaling of one's thoughts in a tense situation is excellent practice.

Sarcasm has no place in the classroom, no matter how much it seems to the instructor and to the students, other than the victim, to enliven the hour. The teacher, out of his superior knowledge, finds it easy to make fun of the student who answers slowly or makes mistakes. The result is inevitably bad blood and decreased learning. A student who feels the lash of a tongue is too uncomfortable to be thinking about the lesson. He naturally begins to dislike the instructor. Later he may well spread this dislike to include the subject and unconsciously do his best to forget both. Good manners are never out of place.

Suspense and general participation are increased if the instructor is careful not to name the student on whom he intends to call until the question has been completely given. If the class knows that Jones is going to have to answer, it is only human of them not to try to formulate answers of their own, and even not to listen to the question. If they do not know to whom the question is addressed, if each thinks he may be in the teacher's mind, they will listen to the question and their brains will begin to work at the answer. Because they have answers of their own, they will listen to that actually given much more closely and more critically. The result is that they share in the drill effect of the recitation. If their answer differs from that given, and if they know that they are free to ask questions, many misunderstandings can be brought into the open and cleared up. It is good practice occasionally to ask the class if anyone had a different answer, but when this is done especial care must be taken to give all possible credit to the answer which is volunteered.

Little time should be spent on trying to force an answer

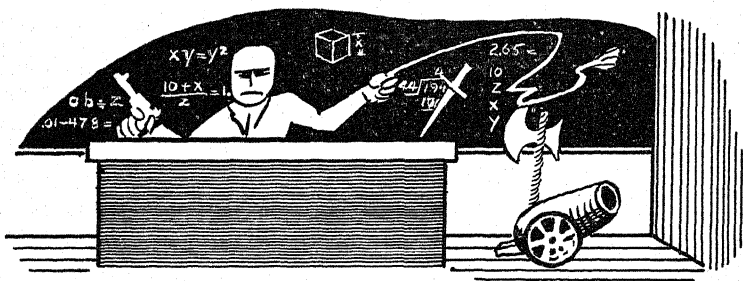
out of a reluctant student. If he says he does not know, the chances are that he does not, and rewording the question or deep probing for illumination is effort wasted. This situation differs from the one where the teacher is trying to build up understanding by asking a series of questions the answers to which are taken together to form a new concept.

How to question each member in the class equitably is one problem which requires the constant attention of the instructor. Students are quick to analyze any system or even the chances of not being called upon when there is an apparent lack of system. Students have also been known who played upon the excellent teaching habit of calling upon men who seem sleepy or inattentive. If a man who is nodding always knows the answer, it is a safe assumption that that is the only part of the lesson he has prepared.

Asking questions in any regular order is the worst way of getting around the class, whether the order is A to Z or A, Z, B, Y. Almost as bad is to keep a weekly balance in recitations so that a man who is called upon today knows that he need not be ready tomorrow. The solution lies partly in tailoring the question in advance to suit the needs of a particular student, but caution must be exercised not always to ask the same man the same type of question. Another way is to encourage volunteer answers to questions not designed for specific students or when a student has failed to give the correct answer.

In any event the instructor must examine his conscience to be sure that he has not fallen into a rut. If, on thinking back over several classes, he cannot remember calling on certain students, he should try to find the reason. Do they

sit to one side, out of his range of vision? Does he feel any dislike for them? Are they shy and self-effacing? Are they bold and making a show by volunteering information they have in order to escape questions to which they might not know the answers?



Are your students shy?

How can recitations be marked if no system is followed? The answer is that no mark should be given for the ordinary recitation. It is distracting and time-consuming, and, because it rests so much on snap judgment, extremely unfair. A five-minute written test at the beginning of each period, practical work in the field, and periodic examinations are better bases for marks. At the same time it is possible after class to think back through the period and to indicate by symbols in one's classbook those students who failed flatly and those who did extraordinarily well. The former can be privately admonished and the latter publicly praised.

Students' answers fall into types. These include the discouraging "I dunno," the smart-aleck "It would seem to me," the counterquestion phrased to throw the teacher off the track, and the long rambling reply which never reaches the

point. On the other hand there are good, short, snappy answers to recall-of-fact questions and well-thought-out, logical replies to application-of-knowledge questions. The teacher can do much to cultivate the better type of answer if he will give praise where praise is due. He can discourage bad manners in answers by completely ignoring the speaker, by seeming not to hear him. In this case, he can repeat his question adding another man's name to it and then for several days avoid calling on the sinner or allowing him any part in the recitation. Invariably the man at fault will come to offer an apology and so create a good background for a conference on ways in which he can improve his part in the classroom and his work in general.

Teachers who do all of the talking themselves, even when they have planned to conduct a recitation, are not unusual. Sometimes this is because they do not wait to allow a student time to formulate his answer. A class is quick to take advantage of an impatient teacher who needs little prodding to answer his own questions. Another teacher-trap is the temptation to expand a student's answer. Sometimes this is necessary but it is wise to try to secure the additional information by further questioning of the class, or to give it oneself in a final summary.

Good class manners and good class habits even in such a variable as answers to questions can be established if they are discussed with the group at the beginning of the course. The instructor starts off by telling the group what he expects in the way of preparation, what types of question he expects to ask, what types of reply he wishes. He is careful to give his reasons in each case and to be sure that the class understands them and agrees with them. He gives a chance for

the class to make suggestions and to discuss the system. From time to time during the course he reviews with them the progress made in classroom technique as well as in knowledge.



Meteorology class at Women's Flying Training Detachment, Avenger Field, Texas. (*Life Photo* by Peter Stackpole)

Informality in recitations will increase as the instructor and the class members grow to know each other better and to respect each other more. Perhaps the very best recitations, from the points of view of misunderstandings cleared up, important points emphasized, and memory aided, are those in which the students answer each other's questions. A step in

this direction is to call for questions from students and then ask for volunteers. "Who can answer that?" Later, students may even question each other directly. But the teacher must always be sure that the recitation is serving the purposes of the course and not running off into a hodgepodge.

Day-by-day evaluation of the results of recitations is provided by including questions which require the application of knowledge covered in previous periods. If students think that they are only held on the day's assignment they will soon make no effort to retain their knowledge. When questions are cumulative, so to speak, the students begin to expect to remember and to review when they find they are forgetting.

The summary by a student of the day's work is an excellent means of immediate evaluation. Some instructors like to warn the student who is to give the summary at the beginning of the hour. Others call on one unexpectedly at the end. In either case the class is asked to volunteer additions and deletions, and the teacher himself can call attention to the points he thinks most important.

The Discussion

A good discussion in the classroom is like a good discussion in a staff meeting. A wise commanding officer places before his staff all of the facts which he has. He encourages everyone, even the youngest, newest officer, to add other facts which seem pertinent and to question the importance of any which have been adduced by anyone. Sometimes slowly, but always surely, a body of information accepted as true and pertinent is built up. On the basis of this, tentative conclusions are reached and tentative plans made. These, in turn, are subjected to critical examination by everyone in the group. Are they the best possible under the circumstances? How will they work? What is to be done in various contingencies foreseen by different members of the group? The commander makes the final decision and issues orders. But he can be sure that he has general agreement and that all of his staff have a firm base for unity in action. The historic example is the conferences Admiral (then Commander) Sims had with his destroyer captains when he was in charge of the flotilla. These resulted in agreement so perfect that each knew what the others would do even when they encountered unforeseen conditions, were miles apart, and were unable to communicate by radio.

Discussion as a teaching method includes, though not al-

ways in logical order, the three steps implied above: (1) the cooperative gathering of facts; (2) the exploration of the facts to be sure of understanding by individuals; and (3) a consideration of the conclusions which grow out of the facts. Illustrations from personal experience, applications to real or imagined situations, and free criticism of the acts and conclusions of others, are part and parcel of the method.

Generals and teachers who have learned to conduct discussions claim that they almost never hold one without themselves receiving new ideas or at least valuable suggestions. There is scientific proof that a group can reach a higher level of judgment than the brightest individual in it, which is another way of phrasing the old adage "Two heads are better than one even if one is a cabbage head." Certainly teachers know that class discussions bring to light students' problems of fact and of interpretation that would never have been disclosed in an ordinary lecture or recitation.

Some warning about the limits of the discussion method is necessary. Too often instructors allow in their classroom sloppy thinking, the poor discipline that is another name for bad manners, and loafing on the part of a large majority, all under the guise of "discussion." Discussion is not the substitution of talking for study. It is not voicing opinions without first ascertaining facts. It is not a haphazard series of statements made by members of the class without regard to the objective of the lesson or to what has already been said by other students.

Discussion is a poor method in any place where the prime purpose is to learn facts, for example, in learning a code. Its only proper use under these circumstances is to help a student understand why he must master the given task thor-

oughly. In other words, discussion does not replace drill. Also it is not as good as a recitation in probing the thoroughness of the students' study of an assignment, particularly when the class is large. It is not as good as the lecture as a means of presenting a body of new facts.

The advantages of class discussions are nonetheless manifold. Facts and applications thoroughly understood are hard to forget, and if dimmed by time they are easily recalled. Discussion discloses and clears up misunderstandings and knits facts into the fabric of memory. Discussion is a far more natural process than either a lecture or a recitation. There are times in the field when a man must listen to another and try later to recall what he said. There are others when he must recite to another facts he has gathered by himself. Most



Discussion discloses and clears up misunderstandings.

plans, however, and most decisions are a result of give and take between several people. The discussion affords experience in this give and take. It trains in the techniques which underlie successful cooperation—namely, listening to the contributions of others, alertness to new information and new ideas, formulation of one's own reports and opinions,

thinking and speaking to the point, and willingness to sacrifice one's own preconceived ideas or to compromise when sacrifice and compromise are necessary to arrive at a correct conclusion.

The discussion method can be used whenever the members of the class have sufficient background to cite accurate illustrations and to exchange reasoned opinions. Take a negative example first. A group of line officers can contribute very little to a discussion between two surgeons as to the best methods of appendectomy. They may profit from listening to the surgeons as much as, or more than, they would from listening to a lecture or reading a book. But except to ask questions, which may clarify points, they have little legitimate part—unless, of course, they wish to offer themselves as material for a demonstration. But the same line officers can learn a great deal from each other in a discussion about navigation. If they happen to prefer different methods at the start they can learn even more. The presence of an air-force navigator would increase the possibilities of learning for all.

Students who have studied the same assignment, listened to the same lecture, heard the same student report, or taken the same field trip, presumably share sufficient knowledge to justify a discussion. At the same time, their understanding of facts, their own prior knowledge and experiences, and the imaginary utilizations which they can make will differ profoundly. The discussion will disclose these differences. It will probably lead to a much deeper realization of the importance of the lesson. It may even lead to new concepts not foreseen by the teacher, the author of the book, or any member of the group.

Discussion is also an excellent means of review. When the

facts have been learned and the time has come to review the students in their application, there are worse ways than to constitute the class a staff, pose a problem to them, and have them seek to solve it through discussion.

The teacher's preparation for a discussion closely resembles that for a recitation. He should be sure of his objectives. He should review the class text and the standard references, and try to stimulate his own thinking by a study of books he himself has not read before. He must consider the individuals in his class and their particular needs. He should think around his subject to find pertinent anecdotes, analogies, illustrations, and materials for demonstration. He must mark useful places in reference materials and rehearse demonstrations. He must think out questions in relation to the objectives and to the needs of individual students.

Three of these points need special comment in connection with discussion: the phrasing of the objective, the use of references, and the preparation of questions.

The principal objective of the lesson should be stated as clearly as possible. This will, in all probability, be the main topic of discussion. It will save much time and many false starts if it is worded to exclude ambiguity, to emphasize one central idea, and to appeal to the interest of the class. Suppose, for example, a class in leadership has studied a chapter on the psychology of fear. The instructor, perhaps with the aid of a course outline, is sure that the main purpose of the course is to help students be good leaders in the field. The purposes of studying about fear are to learn to control it in oneself, in one's men when they seem about to succumb to it, and to handle men who have succumbed. There is a better chance of a good discussion if the instructor, instead of an-

nouncing, "Our topic for today is fear," says, "In taking up fear, let us talk first about fear in ourselves—how we know we are afraid, what is likely to have caused it, and what we can do about it."

Reference books familiar to the teacher are an asset in any classroom, and most of all when discussions are in process. The better the students, the more keen the talk, the more likely it is that an appeal to an authority other than the teacher's may be in order. It is a poor discussion leader who never finds himself in a place where he knows that he is ignorant. If a student raises an unfamiliar point or asks a question to which the teacher does not know the answer, a bluff may be disastrous. The proper procedure in cases which can be cleared up quickly is to consult the reference book then and there, for example, to turn to the dictionary to determine the proper pronunciation of a word. But when it would take an inconveniently long time to find the answer, it is wise to say, "I do not know the answer. Can anyone in the class help us out?" Failing satisfactory help from a member of the group, go on to say, "I'll look it up before next time and you look it up, too. Do you know where to look?" Then be sure, at the next meeting, to ask the student if he has found the answer and to let him and the class know that you have kept your promise.

The preparation of questions for a discussion differs somewhat from their preparation for a recitation. The discussion question is a leading question. For example, a teacher of meteorology holding a *recitation* on clouds might ask, "What classifications do clouds fall into, Mr. —?" "What do cirrus clouds portend under different conditions?" In a *discussion* these questions might be recast as follows: "Who noticed

the cloud formations on the way to class?" "What forecast would you make?" In preparing for the recitation, the teacher bases his questions largely on the assignment. For the discussion he tries to think ahead and have ready questions involving both the assignment and the experience of the students. A special problem in the discussion is to word questions and otherwise to plan so as to bring out the contributions which one knows that individual students can make. At the same time, questions prepared for a discussion will serve for a recitation if the discussion falls flat and a change of plan seems suddenly advisable.

The conduct of a discussion in class is an art by itself. It needs thought, practice, and a conscious effort toward improvement on the part of both the teacher and the class. Some general principles can be laid down and some common problems posed, but each teacher must work out for himself his own best techniques.

A warming-up period at the beginning, before the discussion starts, is almost essential. Many good discussion leaders follow the plan of first giving out the advance assignment and then summarizing the previous discussion. They allow five or ten minutes of a fifty-minute period for these purposes. Their summary includes the high points which were made in the last period, points which were omitted which they think important, and a linking of the discussion with the general objective and with the topic for the day. This system serves the double purpose of starting the students' minds on the right track and of making it possible to continue the day's work right up to the last minute. And the better the leader, the more apt he is not to have time left at the end of the period, either for summarizing or assignment.

An introductory ten-minute lecture on the high lights of the assignment and ways in which they may prove useful is given by some teachers. This can build up the topic for the day and at the same time give the class a review of the facts which they will need to discuss it intelligently.

Other methods of getting students' minds at work along the lines of the topic include various types of written papers at the beginning of the hour. For example, students can be asked to answer questions of fact covered in the assignment and basic to the plans for the day. This daily "five-minute paper" is a favorite with American college instructors. Or the teacher may call for written comment on a pertinent passage placed on the board or read aloud to the class. If the discussion involves a matter open to debate, the members of the class can be asked to vote on the motion before the argument, and to give briefly their reasons. It is then interesting to ask them, at the end of the hour, to compare their first vote with their present opinion.

The setting of a problem and asking for a plan of action in a hypothetical situation are useful ways to set the stage for discussion as well as for recitations.

Starting the actual discussion, that is, giving the members of the class a vocal share in the work, is less difficult than the novice expects. Usually a leading question is enough. This should be phrased so as to call for volunteers to answer, for example, "Is there anyone here who can give us a personal experience with fear?" and not, "When were you last afraid, Mr. —?" In the rare case of there being no volunteers, the specific form of the question can be substituted. Other ways of wording leading questions include the phrases "What do you understand by —?" "Can you give us some possible

applications of ——?" When, in order to provide a sound basis for discussion, it seems necessary to add facts to those covered by the assignment and by the instructor's introduction of the topic, the first question can be "What additional facts does anyone think we need?"

Topics suggested by the class may serve to start discussions. The instructor can ask, "What was there in today's assignment that you would like discussed further?" or "—— that you need more information on?" or "—— that you think important?" or "—— that you think wrong?" And the old standby questions "Why?" and "How?" are useful levers in keeping the ball moving.

The teacher's part in a discussion, once it is started, should be kept to the minimum compatible with his responsibility. The more he seems to be just another member of the group, taking vocal part only when he has something special to contribute, the better. But all of the time he must be aware that it is his duty to keep the discussion to the point, to see that it is progressing to his objective, and to be sure that each member of the class is profiting from it. There is a temptation for the instructor to use "duty" as an excuse to talk too much. A class is quick to assist the teacher to turn a discussion into a lecture, but out of class they are just as quick to criticize him for it. In general, let the student who has opened the discussion, or anyone who is speaking to the point, have his say. Then wait several seconds to see if a comment is volunteered. This wait may seem embarrassingly long, but it is better to take the chance of being embarrassed than to fall into the habit of choking off discussion by assuming the role of commentator. If no one volunteers, ask a direct, specific question based on the student's remarks. Do not refer to the

silence, even indirectly. Do not say, "Hasn't anyone any ideas?" And above all, avoid the sarcasm, however faint, of remarks like "Am I to assume that you all know everything about this small subject?"

Basic facts are easily ignored in favor of mere opinion. Some class "discussions" descend to the level of an argument between a citizen of California and one from Florida. "California has a better climate." "No it hasn't." "*Yes, it has.*" "NO IT HASN'T!" "YES, IT HAS!!"

The instructor can usually keep a class to the facts by putting in an occasional question of the "why" or "how" variety. He can make parallel lists on the board of the facts claimed as support by each individual. He can say, "What is your authority?" and if it happens to be a reference to a book which is in the room and if the teacher has doubts, he can ask the student to look it up then and there.

Sidetracking the teacher is the favorite classroom sport of some students. Many a student has saved himself temporarily, but cheated himself in the long run, by asking an old line officer a seemingly innocent question about battleship tactics. Nothing stops this type of interference quicker than instant recognition of the student's intention and a quick grin in his direction. It is not necessary to laugh at him, or to make any remark. His classmates will do both, the minute the period is up.

Steady progress toward the objective is a more difficult matter. Often discussion discloses unforeseen misunderstandings which require time to clear up. New and legitimate bypaths must be explored. Questions which seem pertinent to a student may seem beside the point to the instructor, and vice versa. The best safeguard is a thorough understanding

and mutual agreement on the part of the instructor and of the class as to what the objective for the day is. Of course, thorough preparation by the instructor and the class is essential for quick recognition and selection of basic facts. When the objective and knowledge of the facts are established, the instructor can bring a wandering class back to the point by asking a few questions, that is, by shifting for a brief time to the recitation method. Usually, only one or two questions of the type which require application of facts are sufficient. For example, a discussion of the symptoms of fear which shows a tendency to lose itself in a consideration of the physiology of the ductless glands can probably be directed in the right way by asking, "Why does action stop the feeling that your heart is pounding?"

Objectives often seem far away at the end of a period despite the best intentions of everyone. When a period is drawing to a close and little progress has been made, the instructor has four choices. He can stop the discussion and in a combination of summary, lecture, and question period try to tie together loose ends. He can allow the discussion to continue right up to dismissal and prepare himself to open the next period with a summary which will bring the various points into focus. He can save time at the end of the period to shift or to add to the advance assignment for the class so as to have them write a paper in line with the objective. Or he can plan to take up the discussion in the next period at the point where time is called in this. His choice will depend largely on the time available for the whole course and upon his estimates of the importance of the topic and of the profit the class is making from discussion. A renewal in the next period is likely to be dangerous, both as a precedent and be-

cause by then the topic may be stale. On the whole, the best plan is to summarize and clarify at the beginning of the next period. By then the students' own ideas are likely to be more ordered. They will follow the summary easily, and they will have ready questions which continue to trouble them.

Active participation in a discussion by all members of a class is a necessity. This does not mean that every student has to speak in every period. Sometimes a silent student is thinking hard and well. Sometimes vocal students are thinking not at all. But the surest sign of attention remains an intelligent remark.

The arrangement of furniture in the room may have a decided effect on discussion. If the class is small enough to sit around a table or in a large circle where everyone can see everyone else, there is likely to be more give and take. Some rooms with screwed-down desks have these placed in rows along the side walls facing the center of the room. This is good when there is anything like a debate. But remember that whereas some arrangements help discussion, no arrangement precludes it.

Brief praise of a good comment is one of the best means the instructor has of promoting general discussion. Statements like "That's good" or "That's well put" or "That's a new and interesting point" may seem to pass unnoticed but actually they not only encourage the speaker but also stir others to try their best.

The reticent student who, because of shyness or lack of self-confidence, takes little part in the discussion profits greatly from simple praise but can be made mute by extended praise or any remark which makes him the center of attention. It repays the instructor to think out the best way

to handle such men. They often have brilliant minds capable of taking leading parts in training and later. One plan of bringing them out is based on a conference or series of conferences designed to let the instructor know their backgrounds and abilities. He can then steer the discussion in a subsequent class so that they can make a special contribution to it. When this is achieved, the leads they give can be followed. They are bright enough to recognize this fact and to take it as a tribute. Sometimes it is possible to accomplish the same ends by reading to the class some of the written work of such a student. In this case, read several papers also in order to avoid seeming to single out one individual, but the lead of the one can be followed. The principles involved are to build up the man's self-confidence and to give him standing with his colleagues, but to avoid everything which might make him feel that his classmates think him "queer."

Silence due to ignorance or stupidity is hard to deal with under any method. The ignorant or stupid student soon loses track of a discussion and begins to daydream. If he volunteers comments they are likely to be far from the mark and to betray him, and he becomes the butt of his brighter classmates. He not only does not profit much from classwork, but he is a drag on the progress of the group. The first step in planning for a person of this type is a careful examination of his record to assist in determining his potentialities. Conferences and perhaps supplementary testing will give more information. If the instructor feels that the student can eventually do the work, he can help him by confining his active part in class well within the range of his achievement. If he is certain that the student can never "make the grade," the best procedure is to eliminate him as quickly as possible.

The overtalkative student is less of a problem but more of a nuisance than the reticent student. The man who always rushes in before the others have a chance to think, and frequently before he has thought himself, the man who talks on and on, long after others have stopped listening, the man who belittles in audible asides whatever others say—all of these are familiar to the teacher who uses the discussion method. The driving force which causes such exhibitions may be a surface egotism but an underlying lack of confidence. These men are usually not popular. They feel it and they try to make a position for themselves by force. A private conference with the instructor will often set them right. They can easily be shown that they are not being fair to the rest of the group and that the group is inclined to resent it. The man who tends to relapse into his old habits after a conference can be reminded by a smile in his direction the while someone else is given the floor. His efforts to take part can be ignored in favor of others who are ready with comment. He can be praised in private when he cooperates. In the last extremity, in order to safeguard the morale of the class, it may be necessary to say openly, "Mr. —, you and I ought to give someone else a chance." Such a direct rebuke is to be avoided as long as possible. It should be administered with good humor. Soon afterwards the culprit should be given a new chance to take part and show whether or not he has learned to control himself.

There are two special means of evaluating what students have learned from a discussion. One is to ask them to write a paper which states the main conclusion they reached in the hour and shows the principal steps which led to this. The paper can be done in outline form with a saving of time for

everyone. A variant is to ask the students to state whether their opinions were changed during the period, and why or why not. The paper can be assigned during time saved for the purpose at the end of the hour, or at the beginning of the next class, or as homework.

A discussion of the day's discussion is an interesting and frequently illuminating technique. It can be introduced by the leading questions "What do you think we have learned today?" "Can anyone add to that?" "What do you think you will remember best?"

It is a good idea to have an occasional class discussion on discussion technique and how the work of the day has exemplified it. Was the topic clearly stated? Was there any confusion rising from failure to agree on basic facts and definitions? Did speakers keep to the point? Were the points related to the objective? Was there general participation? Did speakers wait their turn? Were good manners observed? Was any useful positive or negative conclusion reached?

Outgrowths of the discussion method include class debates, class consideration of hypothetical problems, and class comment on reports by individual students or student committees. It is probably not stretching the range of the method too much to say that it includes mock trials by court-martial and student imitations of staff meetings or foremen's discussions.

Certainly these devices and their counterparts outside the classroom profit from the experience which the discussion method gives in phrasing one's ideas, in alertness, in open-mindedness, and in initiative.

8

Teaching in Laboratory and Shop

Laboratory and shop teaching have much in common. In both cases students learn by doing. They are dealing with concrete materials and achieve tangible results. They work more or less separately and at their own speeds. It follows that the instructors naturally have many problems in common. They must oversee large groups, but they cannot watch every man every minute. They are responsible for the safety of men, apparatus, and machines under conditions where safeguards are often difficult. They must see that materials are not wasted. Above all they must be sure that the work which the students do is contributing to the ultimate objectives of the course.

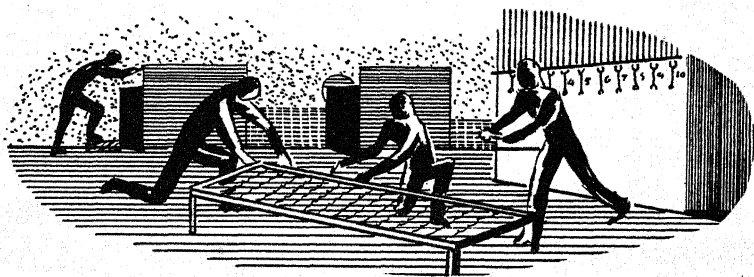
A definite objective known and agreed upon by both instructor and students is of the utmost importance in laboratory and shop work. General objectives set up by course outlines are likely to include knowledge of the specific subject, knowledge of scientific method and scientific thinking, techniques necessary to carry on work in the field, and good habits of neatness, accuracy, planning, close observation, and careful recording. There is reason to believe that the laboratory method is not the best way to teach all of these. Knowledge specific enough to come within the limits of most student experiments can be taught more quickly and more

thoroughly by a combination of study, demonstration, and one of the classroom methods of instruction than it can by work in the laboratory. This has been proved again and again by well-controlled research. It is highly probable that scientific method and scientific thinking are also better learned through study and discussion than by trying to have the student deduce them from experience in the laboratory. Each is a part of the study of logic and so of philosophy. Granted that they are needed in advanced laboratory work, in independent research, and really in most of the constructive work of life, a non-laboratory approach to their study seems preferable. Perhaps the best start in their pursuit is to read the biography of a scientist, for example, the Vallery-Radot "Life of Pasteur," and the article on Science in an encyclopaedia. A discussion of how Pasteur used the principles of science often gives more insight into scientific method than many hours of personal experimentation.

Techniques and good work habits are another matter. These must be learned by practice. This is the real function of "learning by doing." But no more than in other methods is learning automatic. There is no alchemy of either teaching or study. If the student does not mean to learn, does not exert effort, and does not understand, he will not learn or remember. Thousands of biology students have cut up earthworms in an elementary laboratory course only to learn to hate the subject. In the same course, untold profit has accrued to students whose interest was already aroused, who realized that to do advanced work in medicine or any of the biological sciences they had to learn the techniques of dissection, of sectioning, of staining, of microscopy, and of recording what they saw by accurate drawings. Similarly men starting train-

ing in shopwork have drilled hundreds of holes and cut thousands of pieces of metal with a hacksaw and produced nothing but scrap. Then, when they came to apply these techniques in doing a real job, they more than likely made a botch of it. Certainly if techniques learned in isolated drill are not used for a long time, they will not be remembered.

The best way of teaching techniques and good work habits is to have the student undertake a piece of work for which techniques and good work habits are essential. The more practical the work, the better. Best of all is to have the result of the work of use to the student himself and his contemporaries. This provides purpose on one end and a definite means of evaluation on the other, and both are aids to learning. For example, the techniques of quantitative and qualitative anal-



The more practical the work, the better.

ysis in chemistry were never better learned than by chemistry students of the prohibition era who wanted to analyze their bootleg liquor. Samples of substances used in the students' daily life, for example, the local drinking water, make good material for practice. Similarly a shop student who has to make or repair the metal frame of his own cot

is in a good position to learn to use drills and the hacksaw.

A demonstration by the instructor and some practice on waste materials is, however, usually necessary before the student starts on work of his own. This differs from practice for the sake of practice. If the student understands that the demonstration and practice are an immediate preparation for a specific task, he will follow the former closely and do the latter carefully. The teaching method here is very close to that employed in the Army Staff College, as this has been described by Col. H. E. Kelly in the "Military Review" for January, 1943. At the Staff College, the procedure is to set the standard by an explanation and demonstration; mirror the fault by a physical demonstration to the pupil of any mistake he makes; suggest the cure by analyzing the reasons for failure; and require the use of the techniques in practical problems which the student can solve.

The instructor's preparation for teaching in laboratory or shop follows familiar steps. First he must be sure of what he is trying to do in the course as a whole, of how the work for the day is related to it, and of how thoroughly the students are aware of the objectives and share them. If he has any doubt on these points, he should prepare a brief lecture complete with anecdotes and summary to give to the whole group before they start work. Next, as with the demonstration, he must be sure that all of the apparatus and materials which will be needed are on hand and in working order. It is not unusual in training programs for the course outline to call for work impossible within the resources immediately available. For the instructor in this situation to achieve the desired result with what he has, requires much imaginative planning.

Preparation should also include running through the class list and trying to plan for each student as an individual. What progress has this man made? Is he so far behind as to need special help? If so, can I spare time to help him during the period, or is there a helpful book to which I can refer him? Is that man about finished with his prescribed work? How can he be kept busy to his own profit and that of the class? By another job? By independent work? By helping some of his slower classmates?

Developing worthwhile tasks which seem vital to students is the keystone of the success of many outstanding teachers. This is a special part of the preparation of the science or shop teacher. First it is necessary to isolate the techniques which are most probably going to be needed in practice and to arrange these in a logical order. Next, it is necessary to find projects which employ these techniques, are in the range of the students' abilities, and are of immediate interest. The last entails familiarity with the students' lives, environment, and purposes. What can be done in the course which will interest them because it will explain some aspect of their everyday life or some contemporary event which seems to them important, or prepares them for tasks which they know or fear that the future holds? What can be made in the shop which will at once give desirable training and be useful to the student or to the institution? Shop students who make good-looking, serviceable bulletin boards for the recreation center receive praise and recognition from their friends, which go a long way in building up an ideal of neat workmanship. It pays the instructor to keep his own eyes and ears open and to encourage suggestions from the class. If inspiration is lacking, try to take time to look over

buildings and grounds and to watch students as they go about their work and to make note of possibilities.

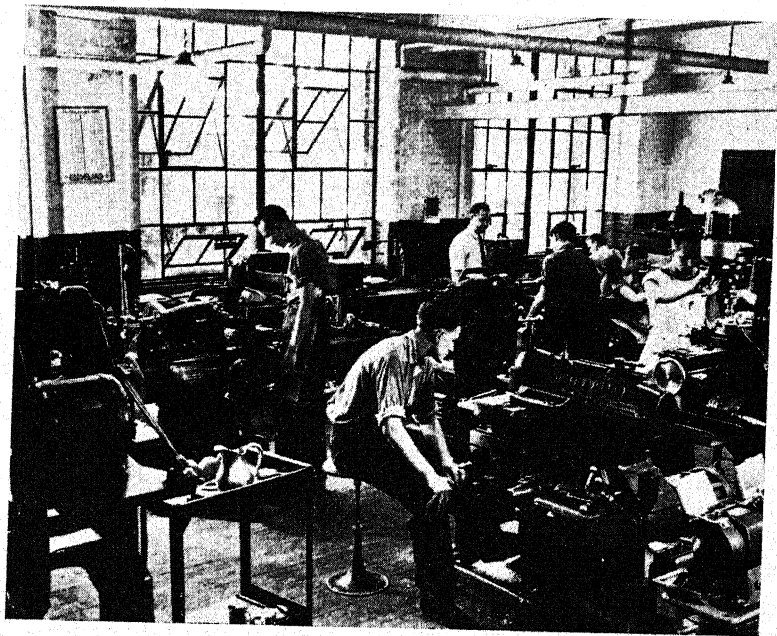
Organizing so that students can start and carry on work with as little waste motion as possible is the first problem in conducting laboratory and shop classes. Efficiency in this respect is one of the principal criteria used by experienced supervisors in judging instructors. It depends largely on a well-worked-out routine. Time is saved in the long run by teaching this routine as one of the first obligations of the course. Matters which must be arranged include positions at the bench, how to draw tools and apparatus, how to draw materials, what to do when help is necessary, where to store unfinished work, and how to return tools and materials when they are no longer needed and at the end of the hour. Other points which must be understood are the time and place to find the advance assignment, methods of checking attendance, methods of marking, and responsibility for loss and breakage.

A locker system is a great help in organization. If a satisfactory system does not already exist, a possible makeshift can be constructed by making simple shelves and blocking them off to provide open compartments of the desired size. Where this has been tried there has been remarkably little trouble with theft or borrowing of students' belongings and work.

Tools, however, cannot safely be left except under lock and key, and a system of checking them in and out to individuals, like that used in manufacturing plants, is desirable. Various systems are employed and various arrangements made for manning them. The simplest is a check list with spaces for a student monitor to indicate who has a given tool. Students,

inasmuch as they are working more or less as individuals anyway, can take turns at being monitor if none of the permanent personnel is available.

Delay in drawing tools and apparatus is a fertile source of general delay and of disciplinary trouble. When students form a long queue and stand waiting, they are not only wasting time, but they are prone to talk loudly and even to shove each other around like children in an overformal elementary school. A long issuing counter, manned at the



Teaching in the shop. (Photograph by Wm. Schmelzer, courtesy Meriden Trade School)

beginning of the hour by several students whose regular duty this is, is one solution. Another is to give each student several brass tags bearing the same number. Students are then allowed to take tools for themselves but are required to slip a tag over a hook next to the tool's place in the rack. One man can usually be sure that no one takes a tool without leaving a tag.

Introductory remarks and the giving out of the advance assignment, if there is one, are handled in different ways by different instructors. Some have the class meet in an adjacent classroom and later adjourn to the shop or laboratory. Others keep them at their benches but do not let them begin work until after the instructor has had his say. Others allow the men to start as usual and call them to attention when they wish to speak to them as a group. If men are well trained to go about their work quickly and if they are likely to arrive at intervals before the formal beginning of the class period and start work for themselves, the method of calling them to attention at some time during the period causes least delay. In this case, it is wise to have a blackboard in a prominent place and to make it a rule to post on the board, before the class begins, the advance assignment and any notices for the group as a whole.

The best teaching procedure during the period is probably that of circulating from student to student but keeping a wary eye open for what is going on elsewhere in the room. Some teachers prefer to sit at their desks and have men bring problems to them. This may help them keep general order, but it is open to several objections. Students who are waiting their turn are idle. It is often necessary to go to a bench anyway to see just what the student has done.

Only those problems the students themselves are aware of, or are willing to admit, come to the attention of the teacher. On the other hand, the teacher who circulates can check on everybody's work. More often than not a student solves his own problem before the teacher reaches him. Frequently the teacher sees several men making the same mistake and can save himself and everyone time by securing the attention of the whole class while he gives an explanation or demonstrates the mistake and the way to correct it. Students who feel that they must have help before continuing their work, can be instructed to raise their hands and keep them raised until the teacher has seen them. Under this system the teacher must make it a habit to sweep the room with his eyes at frequent intervals, but this is a good habit at all times. Finally, the teacher who circulates has a much better chance of forestalling accidents and waste. He can be sure that safety devices are being properly employed and that students who are supposedly testing fertilizers are not using nitrates to make gunpowder.

Demonstrations of techniques and methods should be a regular part of laboratory and shop teaching. The advice given in the chapter on the demonstration as to preparation and staging is applicable here. Most of all, the teacher should be sure that when he does give a demonstration, everyone can see, and that when and wherever he speaks to the class as a whole, everyone can hear. There is a great temptation to overlook these points when the demonstration is given in connection with a single student's work. It is natural for the instructor to stay by that student and for him to begin the demonstration or explanation before others have had time to arrange their work and take positions from which

they can see. If a demonstration is worth interrupting a class to give, it is worth the time it takes to be sure that everyone shares in it. If necessary, go to the front of the room or to a central point. Keep the near students from crowding too close. Ask if everyone can see and hear. Allow a minute or two for questions and discussion.

The student who finishes before the rest of the class, either because he is bright and quick or because he has had previous training, should not be allowed to idle. First check and be sure that he has done his work well and without skimping. Then arrange for him to go on to more advanced work, or to help slower classmates, or to study or write. Early dismissal of men who finish early is a mistake. It encourages undue haste. It tends to make men do the day's work just to get through it rather than with an eye to future usefulness. It discourages slower men who may be doing a better job.

Promotion of good habits of neatness, accuracy, close observation, and careful recording, is a generally recognized function of science and shop instruction. This should be provided for in the teaching method. Students do not learn good habits without intention, attention, and effort any more than they learn facts without hard study. Nor do good habits cultivated in one course necessarily transplant themselves to other courses or to life in general. To receive broad benefits from his training, the student must develop a conscious ideal or at least make a generalization which shows the possibility of wider applications. The instructor can be of great assistance in this connection if he will make opportunities in his dealings with individuals and in his classwork with the group to discuss applications in other fields.

Analogies, anecdotes, and description by the students of personal experiences are all useful. A simple example will have to suffice. A man who does neat work in mechanical drawing may be poor in mathematics because his columns of figures are never straight. The possibility of drawing lines to guide columns can be pointed out, and it is even legitimate to crack a bad joke about a straight line being the shortest distance between two points. The advantages of neatness in dress can be cited as an additional parallel.

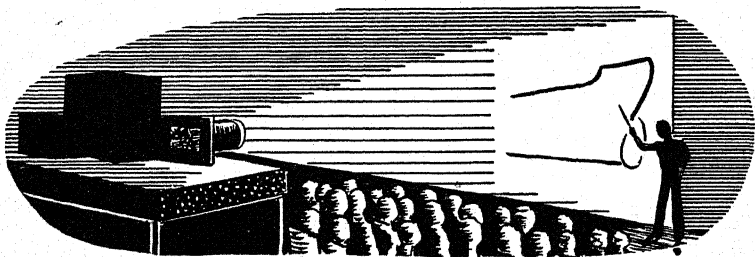
Praise of good work or of improvement along desired lines is one of the best ways of instilling good habits. When it can be done sincerely, it is hard to overdo it.

Evaluation of progress in laboratory or shop work falls more to the student himself than in most fields. He can see for himself what he has done and compare it with what his neighbors have done. Evidences of mistakes are likely to linger in the finished product. And a well-planned project will include the acid test of use.

Faculty colleagues have much to learn from good teachers of science and shop, particularly the ways in which students are encouraged to be responsible for themselves and for their results. "Responsible learning" is a goal for everyone.

Visual Education

Drawings, maps, globes, specimens, exhibits, models, and photographs were useful adjuncts of teaching long before the day of the motion picture. Many people learn better from seeing an object than from printed or spoken descriptions. Motion pictures, both the silent films and the sound films, have given new meaning to this fact. And they have brought



Visual education.

in their train a revival and great technical improvement of the older forms. The smelly magic lantern that was always out of focus has given way to a modern machine that can show any type of colored or black-and-white picture, photograph, slide, or slide-film and even provide synchronized lectures.

Available apparatus will be found listed in the catalogues of the camera and film companies and in those of school and college supply houses. There are also several magazines and good books devoted to visual education. Various publications list available films together with directions for their rental or purchase. The United States Office of Education employs a visual-education specialist who is glad to give information on official materials, including most of those prepared for the armed forces. Three references which will be found helpful are the book "Audio-Visual Aids to Instruction," by Harry C. McKown and Alvin B. Roberts; the magazine "Educational Screen," published monthly; and the various editions and supplements of the "Educational Film Catalog," in the "Standard Catalog Series," published from time to time.

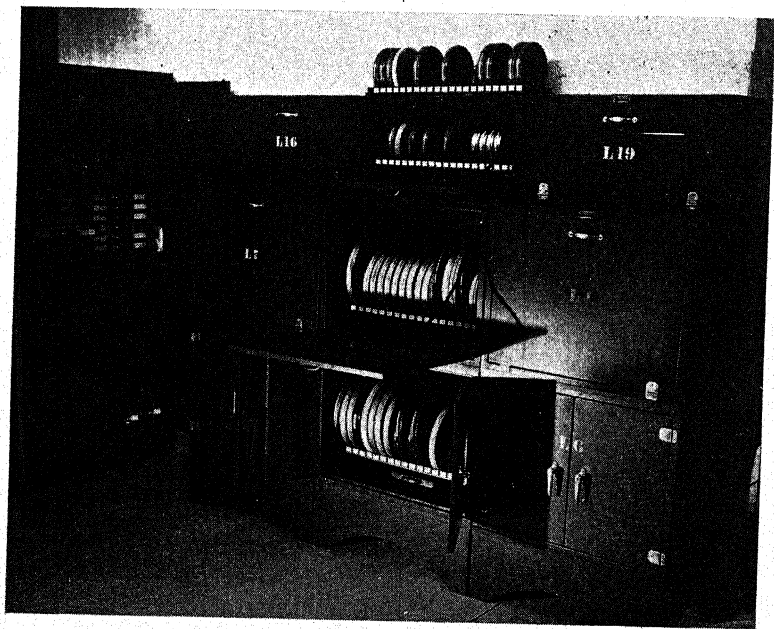
Teaching methods differ in detail with different kinds of visual materials. They also have much in common. Because the motion picture is now widely used and frequently abused, it will be considered first.

Preparation for the use of motion pictures has to be thorough, and the class must share in it. The movies of everyday life are such a common source of entertainment that teachers and students are very likely to take educational movies as a period of relaxation. But experienced teachers, and novices who have read thus far in this book, know that there is no method of teaching which does not require work. Sound motion pictures are no exception to this rule. The voice of the commentator may be that of a great authority, but he cannot know the individuals in a class, their needs, and their misunderstandings. Nor can a mechanical voice

conduct a group discussion. One old-timer has said, "A movie does not teach students how to think."

The instructor must see a film before it is shown in a class if the best results are to be obtained. Even when the instructor has used the film before, he will do well to review it again just as he would review a chapter in a familiar book assigned to the class for study. The following five groups of questions may help the teacher about to preview a film.

1. Is the film going to be useful? Is it related to the ob-



A well-organized film library. (Courtesy *United States Merchant Marine Cadet Corps*)

jectives of the course? Is the information it gives correct and up to date? Will it hold the interest of the class? (Remember that time is valuable and that a poor film may be far worse than useless. Just because you have ordered a film, you do not have to show it. Have the courage not to show it at all if it does not meet your requirements.)

2. Is now or later the best time to show this film? If later, will it be available then? If it will not be available, what shift in plans is necessary in the way of classwork to help the students profit from it now?

3. Do any parts of the film need special explanation or comments to make them clear, or to emphasize their importance? Should any single frame be shown as a still? Are any parts unimportant and to be passed over quickly? (Some makes of projector allow a picture to be held at one point, or even reversed, while the teacher comments. Most can be run in slow motion, and all can be speeded up. Obviously the instructor must know in advance when to ask for a stoppage or for slow motion.) What are the cues for stopping, slowing, reversing, or speeding up the picture?

4. Should different individuals be warned to watch carefully for some section of the film which might clear up a problem for them or be of special interest to them?

5. How long will it take to run off the film, allowing for comments, slow motion, and stops? Does it need so much time that it must be started at the beginning of the hour? That it will have to be shown in two sections? Is it so short that something else must be planned to fill out the period profitably?

Preparation of and by the class for the showing of a film increases the good results immeasurably. If a film is sprung

on the class, the dangerous attitude of relaxation, of just going to the movies, is increased. So also is the critical feeling caused by the lack of passion and excitement, even if the film is one on first aid and features a pretty army nurse. But when the class expects a film, knows the subject, and is on the alert to profit from it, there is more chance of their learning. Any of the regular classroom methods can be used to prepare the class, but a combination of recitation and discussion has been found most useful by many teachers. They begin by giving the title of the film to be shown, then ask various members of the class what they think will be in it, how they think it will serve the objectives of the course, what it might show of interest to them individually. Students are then quite likely to raise questions of their own: "Will it show one of our tanks actually under fire?" "Will it have an animated cartoon of how those detonators work?"

Questions raised by the class, if they are going to be answered in the film, are one of the best means of creating suspense. A personal interest in finding out something will make a man pay keen attention to, and retain facts from, the rest of the film. It is a teaching device as good as the fictional suspense we feel as we watch the cabin teeter on the edge of the precipice in Charlie Chaplin's "Gold Rush." A lecture to the class on what to expect is quicker and better than nothing, but really not nearly so effective as the recitation-discussion procedure.

Class procedure in showing a motion picture closely resembles that of the demonstration. The projector should be set up in the room, the film threaded, the screen hung, the focus tried, and arrangements for darkening the room tested

before the time the class is scheduled to start. A delay while the instructor fusses with the film or the window curtain is worse than time lost. The class inevitably begins to talk and to think of other things, and so is quite likely to miss the full import of the first part of the film. If a crowded room-schedule makes advance preparation impossible, the instructor should give the class something definite to keep them busy until the apparatus is ready.

Changing films and the breakdowns which seem inevitable in classroom movies also involve costly delays. These can be minimized if the instructor does not fool himself about the amount of time they will take. Fussing with a film in the dark takes longer and creates an atmosphere more handicapping to class discipline than the same task in a lighted room. So, when an interlude is necessary, put on the lights. Here, too, it is wise to have something for the class to do. They can be told to write up their notes on the film so far, outline on paper what they expect to see in the rest of the reel, or study a text connected with the subject of the film. Another device to fill in these interruptions is to appoint, before the film starts, one or two men whose duty it will be to lead class discussion of what has already been shown, when for any reason a halt is necessary.

Follow-up of a film, both immediately and after a few days, increases its usefulness as a means of teaching. If students agreed before the film that they would look for some special feature they should be asked to describe what they saw. General discussion can be inaugurated by questions like "What interested you most?" "What didn't you understand?" "What did you see that will be useful to you?" "What parts of the film would you like to see again?"

A re-showing of the film, particularly if there have been many requests from the students, is one of the best ways of follow-up. Even without a re-showing, it is a good idea, after some time has elapsed, to ask the class if the film is still fresh in their minds, if they have used anything they learned from it, if they have told any friends about it, and if there is anything which, on looking back, they feel they do not now understand.

Evaluation of a film's usefulness can be made on the bases of these follow-up discussions, of the questions students ask, and of their requests to see it again. Lack of comment, granted the opportunity to talk, is almost more of a criticism of a film than adverse comment. Adverse comment at least indicates that the men have thought about the film and not taken it just as a time filler. The instructor must, however, make his own direct evaluation of the clarity, interest, and usefulness of the picture. Of course, if students show new understanding of theories and new knowledge of facts as the result of seeing the film, its usefulness is proved.

Film strips, slide-films, and slides resemble motion pictures as teaching aids. They have the advantage that a single picture of particular interest can always be held on the screen as long as desired. Slides have the further advantages that they are inexpensive and that the instructor can make them himself or have them made to suit his particular purposes. Slides make a valuable supplement to a demonstration. In fact, they may be superior to the demonstration itself in some ways. It is easy to show them so that all of the class can see what is on the screen. The relation of some parts can be shown without the confusion of the rest of a mechanism. A series of slides can show a succession of movements

which may be indistinguishable in fast-moving machinery and not clear even in a slow-motion picture or animated cartoon.

Other visual aids to learning include maps, globes, charts, blackboard drawings, specimens, museum exhibits, working models, and demountable models. Often many of these are made by the class. This serves a double purpose: the students learn as they do the work and the results are available for later classes. In general, the techniques of preparing, using, and evaluating these aids resemble the techniques given for demonstration and those given for the motion picture. The main considerations are to be sure ahead of time that the materials are ready and in working order, to be sure that everyone in the class can see what the instructor means him to see and at the same time hear what he says, and to arrange a recitation or discussion which will bring out possible misunderstandings. Perhaps one most-necessary warning is against forgetfulness that these instruments are available. Motion pictures and expensive sets of films have somewhat submerged the virtues of older instruments.

A central library of films and other visual aids is an economical way of securing a wide range of materials. It may even make it possible to secure one or two technicians who can be responsible for the scheduling, operating, and upkeep of the equipment and for the manufacture of slides. A technician with initiative will become familiar with catalogues and bibliographies and be in a position to make many suggestions to the instructor. A library can be started even if there is no specialist in charge, if the various instructors will cooperate in setting up a system and then abide by it. A possible system is to have all materials shelved in one

room, the key to which is left in a central office which is usually open. A card catalogue of the materials, indexed by title and by subject, is made. The cards can be printed with five columns, headed:

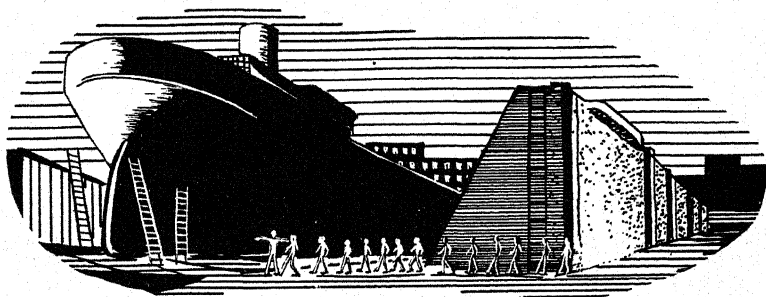
Reserved by	For use	Room	Returned	Condition
	(date)		(date)	

It is a good idea to place on the back of each card a description of the use made of the materials and remarks by the instructor on their merit.

10

The Field Trip

The field trip is already widely used in training programs. It deserves still more attention. No matter how well a training station is equipped, there is an advantage in seeing machinery actually at work and men actually on the job. There is a wide difference between learning about a thing and learning the thing itself. An airplane engine mounted on



The field trip is an organized expedition.

the test block is one thing; it is quite another when in a plane which a pilot, after circling the field two or three times, has brought back because of motor trouble. A navigation classroom may have a full-size copy of a ship's bridge along one side. A real ship's bridge, even when the ship is at the pier,

always has something that the model lacks. A welder working high up on a ship's side gives a more exciting demonstration than the best that can be staged in a shop. It may be only atmosphere; but seeing things as they actually are makes training practical. It causes the student to see himself as he hopes to be and so provides the best possible motivation for hard work during training.

Efficient organization of the details of a field trip requires careful planning in advance if the maximum results in learning are to be secured in the minimum of time away from regularly scheduled classes. First the instructor must be sure that the objective of the trip, what is to be seen, heard, and done, will be worth the time to be taken. A surprising number of trips are made to see things of no intrinsic interest, or so elementary in their scope as to be of little value, or so complicated as to be beyond the students' grasp. One class in physics was taken, at some expense of funds and much of time, to see electrical transformers. These looked just like huge corrugated tin cans set upright behind a fence in a field. They did not move and no details were visible that the photograph in the students' text did not show. The men amused themselves by shying stones at the small red sign "Danger—High Voltage." Even worse, instructors have been known to take students to visit a ship only to find on arrival at the pier that the ship had sailed.

A check list of advance arrangements (granted an objective of sure value to the class) includes: a preview, if possible, by the instructor; permission from one's own superiors to make the trip; permission from the authorities at the site to make the proposed visit at a specific time; the route to be taken and methods of transportation to be

used, down to the last detail of sides of the street to walk on and corners to wait at; arrangements for meals while away, whether these are to be taken along or ordered in a restaurant, and, if the latter, reservations at the restaurant and payment in advance of any sum for which students will be responsible; a survey of toilet facilities and an allocation of time for their use in the trip's schedule, especially if the group is large; where, when, and to whom to report on arrival at the site; reservation of guides if these are needed; type of clothing required; and permission to take photographs or make sketches. Before departure on the trip, be sure that the central office knows time of departure, route to be taken, methods of communicating with you while you are absent, and probable time of return.

A class period devoted to preparation for the trip is a necessary preliminary. The class can be given information about the arrangements which have been made and about the schedule to be followed. They can be warned about dangers en route and at the site. They can be told what they will need in the way of clothing, money, cameras, and notebooks. If photographing or anything else is forbidden, they can be told what to leave behind. An understanding as to what is expected in the way of behavior can be reached, and the men led to realize their responsibility to their organization, their companions, and their successors. A rowdy student inspection has many times resulted in refusal of permission for return visits. It is a good idea to drill the class on the arrangements and on their duties as individuals and as a group.

What is to be seen and what learned and how these are connected with the work of the course should also be con-

sidered with the class as part of their preparation. There will be certain items of interest to the whole group and others of particular interest to sections or to individuals. There will not be time at the site to explain these and to direct students to separate places. The more each man knows what he wants to see and where he will find it, the less confusion and loss of time there will be. The students may not have time to take advantage of all the opportunities for learning which the trip affords. In such a case, it may be wise to divide the group on the basis of the needs or interests of individuals, and to assign to different students the responsibility for seeing different things and for reporting on them to the class at the next meeting.

On arrival at the site, be sure to report to the proper official. If in doubt, report to the senior officer or employee present. Check on the fact that the class is expected and on the arrangements. Here the wisdom of concluding detailed arrangements in advance will become very evident. Students who have to stand around waiting while their leader finds out what they can do, get tired and bored and are prone to make trouble. In any event, they are not in the best frame of mind to profit from what they are about to see. On the other hand, it may pay to plan a few minutes' interlude to let them settle down after the distractions of the trip from home. One good method is to have the instructor give them a brief lecture, almost a pep talk, on what they are going to see. Sometimes this lecture is given by a welcoming official or a guide. This is desirable, but a tactful way must be found to limit the time the stranger takes, so that the official welcome does not use up all of the time allotted for the trip.

Problems of teaching during a visit are many. Students, even when following an agreed plan, tend to herd together at one moment and scatter beyond range at another. Part crowd on the heels of the instructor and part straggle far behind. Crowding, as in the case of a demonstration in the classroom, results in only the few in front seeing and hearing. Aimless scattering results in distraction, sometimes valuable but more often not. There are several ways out of the dilemma though not all of them are always possible. One obvious way is to secure enough guides so that each is responsible for only three or four students. This is more easily said than done. It is more practical to have small groups of students circulate on their own in accord with a plan worked out beforehand. Or the instructor can take his stand at a point where an explanation is necessary and repeat it to group after group. This is time-consuming but better than the time-wasting so often seen. A variation of this is to have small student groups go to assigned stations and do what they can for themselves and then to have the instructor circulate from group to group to point out features, ask questions, and answer queries. But in the great majority of cases the group will move as a group, with the instructor leading the way. He must then be sure to wait at each halt until all are present, and to arrange them so that as many as possible can see and hear.

Rounding students up after a visit and getting them started home may cause some difficulties. Trouble can be avoided by advance agreement on whether or not stores can be visited, and if so, when and for how long. The holiday mood that accompanies a break in routine is perhaps an

advantage to learning, but it is a danger to discipline. A feeling of responsibility on the students' part and prompt action on the instructor's are the best safeguards.

The follow-up of a field trip may well resemble that of a motion picture. A discussion based on what was seen, what was helpful, what puzzling, and what will most probably be useful in the future will cement facts in the men's minds and give the instructor an idea of the value of the trip. An exhibit of sketches, photographs, and notebooks is another means of follow-up. A frequently neglected detail is a letter of thanks to the authorities at the site, sent from the class via a student secretary. An expression of gratitude is more than good manners, it is good policy. It should be a regular practice to have the group discuss the way the arrangements worked out and make suggestions for procedure on future trips. This adds value to the experience because the field trip is in more ways than one a dress rehearsal for future practical duties.

11

Criteria for Problems Used in Teaching

Problems set for the individual or for the class as a whole to solve are an old and tried teaching method. They can be used to start a class, at any time during a period, or as an outside assignment. Problem solving also has a frequent part in the evaluation of what students have learned by other methods. There are many variations, from the problem in arithmetic or geometry where all the factors are known and only calculation is required, to hypothetical problems of grand strategy which involve isolation of separate questions, searching for information, establishing hypotheses, and passing judgments. Well-chosen, well-organized problems not only afford students and teacher a chance to show what has been learned. They are in themselves excellent means of stimulating study and giving practice in the application of knowledge and the use of originality and initiative.

The choice of a problem may be made by the teacher, or students may suggest problems on their own. In either case there are certain criteria which the teacher must apply. Is the problem related to the objectives of the course? Does it afford an opportunity for the use of principles and techniques which are part of the course work? Is it within the range of possibility with due regard to the ability of the



A group project. (Photograph by *International News Photos*)

individual or group, the time available, the reference books and source materials on hand, and the authorities who can be consulted? Where construction is involved, have the students the necessary skill? Are rooms, tools, and materials available? The completed problem in every case ought to seem real to the student and in itself be a means for him to judge how well his work has been done.

Finding suitable problems is a part of the teacher's preparation. The textbooks contain many, though too often these are so far from reality that they defeat their own purpose. A man who is set an arithmetic problem on the cost of women's dress goods can see little point in doing it. Nonetheless, the instructor should examine various textbooks with a view to collecting good problems. He can keep the sample books sent him by publishers or even buy a few in addition to those used in his classes. Schemes tried by other teachers can be imitated without shame. The instructor's own professional reading and the daily papers will give many suggestions. One teacher of first aid, for example, collects current newspaper accounts of accidents. These he takes to class and asks his students what they would do for the various injuries described. The result is a keen realization on the students' part that they are learning something which they may need at any moment.

The essay, the book review, and the report by an individual are governed by most of the principles affecting problem solving. The same criteria apply to choice of subject, especially the criterion of ability to carry on to a successful conclusion. It is absurd to allow a novice in gunnery to choose for his first topic the factors in muzzle velocity. That can come when he knows more about the elements of manu-

facture, to say nothing of how to point and fire. The too-ambitious subject defeats its own ends by not affording training in fundamental techniques and theory and by leading to confusion.

Group problems and reports require careful organization. It is better experience for the students if they do their own planning and assume the responsibility for saying who will do what and for fitting the results of individuals' efforts into a comprehensible whole. The instructor, however, should take enough part in the planning to be sure that there is not a needless waste of time. A question here about practicality and a suggestion there about procedure can do much to speed matters up and to illustrate the proper ways of working.

Public exhibit of the results of problem solving is advisable whenever time and the nature of the problem permit. The single student can read part of an essay to the class and answer their questions on it. A student secretary can report to the group for a committee. A shop class whose members have combined to make an engine model can exhibit it in the hall of the engineering building. The criticism of one's colleagues is a necessary part of improvement in a practical situation, and the more training one has in giving it tactfully and profiting from it personally, the better. Public performance, if it is recognized as well done, also gives a satisfaction in achievement which promotes memory and leads to even greater effort in the future.

PART 2

Fundamental Situations and Practices

The First Class

His first class may in prospect be a source of terror to the instructor. One naval officer who had been six months at sea and seen much action was detailed as a teacher in an officer-training course. In the first group of twenty-five candidates were at least two men who had been decorated for bravery. Someone had told him that it was a good idea never to sit down when teaching. The class drifted in by twos and threes and found seats for themselves in silence. Long before all were present, the officer retreated behind his desk to hide his shaking knees. A few weeks later he discovered that the men in the class had been told by his predecessor how strict he was and that they were even more frightened than he.

Another teacher, now a professor of biology, had worked through the summer vacation preceding his first job in preparing a course of thirty lectures. Under the excitement of the first day he talked so much and so fast and the awed class talked so little that he delivered three of the thirty. By the end of the hour he was panic-struck, wondering how in the world he would fill in the last twenty days. He soon found out that the real problem is not how to fill time but how to find time.

The new teacher (and the experienced teacher, too) nonetheless does well to have prepared more work for each

period than he and the class can possibly get through. This backlog of teaching materials gives a feeling of self-confidence and security that everyone finds helpful. Again and again circumstances change plans and the reserve must be called upon.

A first-day routine which many excellent teachers use is described below. The novice who has ideas of his own about how a class should be inaugurated should by all means carry them out. But he should also consider including most of the



Personality: Professor Corbin's last class. (Photograph by George B. Keeley, courtesy *Yale Alumni Magazine*)

procedures given here. They require thoughtful advance preparation, but so does all good teaching.

The classroom ought to be looking as bright and attractive as possible. Floor, desks, blackboards, windows, and walls should be clean. Flowers on the desk are a help, and it is foolish to think that they are beneath the serious dignity of the instructor. A bulletin board filled with pictures and pertinent clippings from current newspapers is a valuable aid in stirring interest. So is a table on which are spread popular and professional magazines with articles about the subject.

The number or other designation of the room, the name of the course, and the number of the section should be written in large letters on the blackboard where they will be seen at once by everyone who enters the room. This serves to reassure men who are in the right place and helps guide the squads and individuals who always appear on the first day wandering around like sheep lost in a foggy meadow.

The instructor's personality is a matter of extreme interest to new students. He is not misleading them if he is extraordinarily careful of his appearance on the first day. It is good practice for the instructor to let the class know something about himself. He should write on the board his own name, rank, office location, and office hours. If he is in a situation where out-of-class contacts are possible, he should add his home address, home telephone number, and the hours when he is at home and glad to receive informal calls or telephone messages from students.

Class lists for every course should be issued well in advance by the central office. The instructor should have made a study of these and of whatever information there is on file about the men before he ever meets them. It is a tremendous

advantage to memorize the names on the list before the first class.

A definite seating plan, usually alphabetical, is essential. It facilitates matters like taking attendance, and it is a great help in learning students' names quickly. If a class list is available, a seating plan can be prepared in advance. This gives both teacher and students something to do from the first minute. If students arrive by ones and twos, smile at each as he comes in and say, for example, "This is Military Science AAA. If you'll give me your name, I'll show you which your seat is." When all the men are present, call the roll, paying particular attention to pronunciation. Be sure that everyone's name has been called and that no one who does not belong in the class is present. If the class marches in as a group, keep them standing, explain the seating arrangement, and call off the names of men to go to their places one by one. It is better to do this oneself than to ask one of the group to do it. Look at the men as the names are called. Be friendly. Ask for immediate correction if there is doubt about pronunciation. If a name is familiar, do not hesitate to ask a man if he is by any chance related to the Boss or hails from Oshkosh.

Class lists may be lacking. In this case, greet the men as they come in and say, "Sit any place now. I'll arrange you alphabetically when I know all your names." The men will then come close to arranging themselves and there can be a later shuffle with a minimum of confusion.

Point to the information about the course and about yourself which has been placed on the board. Explain when you are in your office and any regulations which govern conference time. If you are ever "at home" to students it is a

kindness to your wife and an added light touch to tell them when they are expected to leave as well as when they can arrive. Young men often find it hard to know when and how to get away.

Next, pass out paper and ask each student to give you a brief list of pertinent information. This list is often printed on forms, or it can be copied on the blackboard in advance. It should include all details in the questionnaire on page 102.

While the students are filling out the questionnaires, and it ought to be possible for them to do it in not more than ten minutes, the instructor should practice their names to himself. It gives a class a very good start if it is possible to call on men by name and not have to point at them. It is awkward for an instructor to be caught like the girl in the blackout who said, "You take your hand off my knee. No, not you; you."

If students raise questions about any of the items while they are filling out the questionnaire, be friendly in your explanations. A question which might be in the minds of the whole class warrants asking everyone for attention and, when this is received, giving the explanation to all. There may be a laggard or two when attention is called. This is a good chance to set the tone of the class. Wait in silence until the man looks up. The others will prod him into obedience without further word from the instructor. When he does look up, go ahead with your explanation without any reference to the wait. The silent interval is impressive and convinces the class that you mean what you say.

Any special rules necessary for the conduct of the class or desired by the instructor should be explained as soon as the papers are completed and collected. These rules should be

Name Rating

 Last First Middle

Station address Official adviser

Home address City State

 No. Street

Education

Grammar school: Place Years

High school: Place Course

 Years Diploma

College: Place Course

 Years Degree

Other courses

.....

Best school subject Poorest

Recent reading: Book Magazines

 Newspapers

Hobbies

Best time for conference

Reason for taking this course (if elective)

.....

What do you hope to learn from this course?

.....

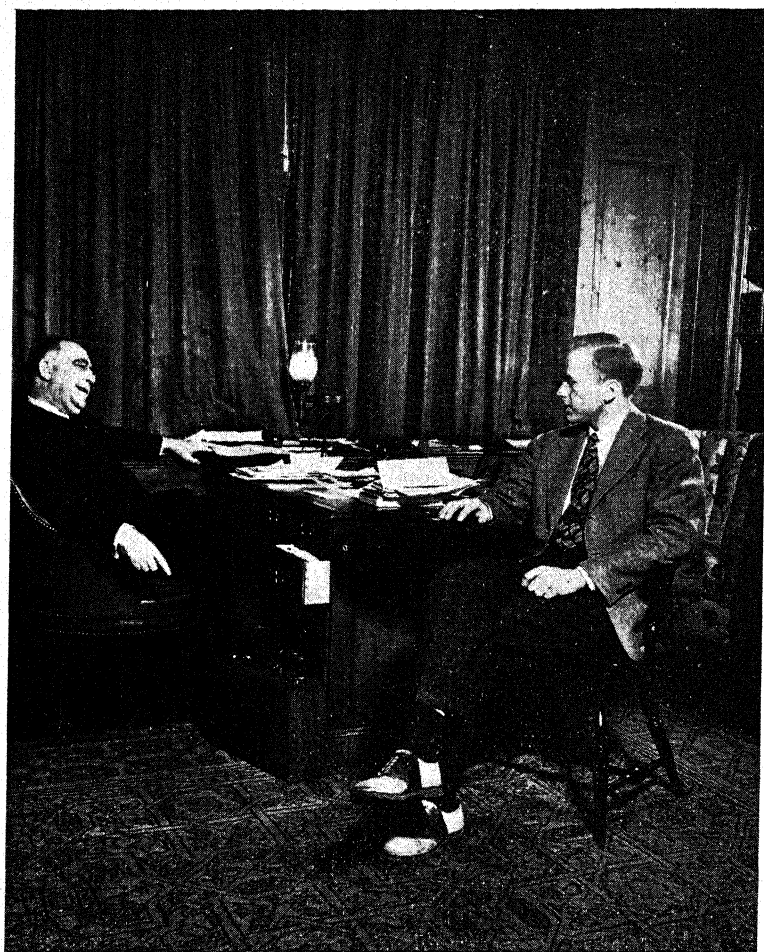
.....

.....

kept to a minimum. They should be discussed until it is certain that everyone in the class not only understands what they are but also agrees with their purpose. The rules and the machinery should include some method by which students can convey their questions, suggestions, and perhaps complaints to the instructor. The instructor who is not absolutely sure that he can elicit these in his everyday contacts with students may solve the problem by making one or two men in the class responsible for collecting the information for him. He may also require occasional papers written in class about possible changes and improvements.

An outline of the course and its objectives comes next. This part of the first period must be prepared with the utmost care. It serves to start the student off with the right kind of determination to learn. Points that can be made in this outline are a general statement in the simplest possible terms of the problem or type of problem which knowledge gained in the course will solve, a contrast of old methods, current methods, and potential methods, a novel bit of useful information, an illustration of how someone has recently profited from a similar course. When the objectives of the course include intangible values like patriotism or "officerlike qualities," extra care must be taken to insure clear formulation and concrete illustration.

Textbooks, general reference books, magazines, popular books in the field, libraries, and all available means of studying the subject should be discussed next. An interest in students leads the instructor to add here some general information about the institution and its resources. A description of how to find and use the library does not suffer when it is coupled with information about facilities for recreation and



The conference: Robert D. French, Master of Jonathan Edwards College, talking with a student in his library. (*Life Photo* by John Phillips)

advice on when and how to use them. An atmosphere of common purpose and mutual helpfulness is established by a description of the course, of its value, and of the best ways to make time for work and play.

The period concludes with the advance assignment, even if it is the instructor's practice to give this out at the beginning of subsequent periods. If textbooks or other materials are to be drawn or purchased, the men should be told where and when it is best to get them. Exact titles and pages to be read should be written on the board. General advice on how to study and specific advice on how to study this course should be given. Unusual difficulties in the first assignment should be explained.

An appointment for a conference, if individual conferences are possible, should be a part of the first assignment. Learning, friendly relations, and morale are developed so much more quickly by an early private contact of each student with each instructor that every effort should be made to arrange one. It is easiest if time is allowed for such conferences in the administration's overall plans for the first week. It pays, for example, to omit classes and drills on the third and fourth days and to schedule conferences then. If there is no such plan and if the free times of an instructor and his students do not coincide, conferences must be held in class time. This can be done by giving the class materials to study while the teacher calls individuals in turn to his desk.

The basis for the first conference is the information written down by the student at the beginning of his first period together with any additional facts the instructor has gleaned from his record. Begin the conference with a friendly reference to any mutual friend or interest which the record re-

veals or to some current event in which both you and the student are concerned. End it with a clarification of the student's objective in the course. Try to listen more than you talk. A satisfactory conference can be held in as little as five minutes, but for out-of-class conferences it is better to allow ten minutes and to schedule not more than five men in an hour. For a class of twenty-five this will take five hours of the instructor's time. It is worth many times that amount.

Time for students' questions should be left at the end of the period after the assignment of the advance lesson and the date for the conference. The opening of the question period is a good place to stress to the men their own responsibility for learning. They must see that they are under obligation to question what they do not understand and to discuss frankly any subject matter or any method which seems undesirable. The role of constructive criticism should be stressed.

Timing is always important. It is a good example to everyone always to begin on time. It is only fair to students and to other instructors always to stop on time, even if the minute comes in the middle of a sentence which—

13

Classroom Discipline

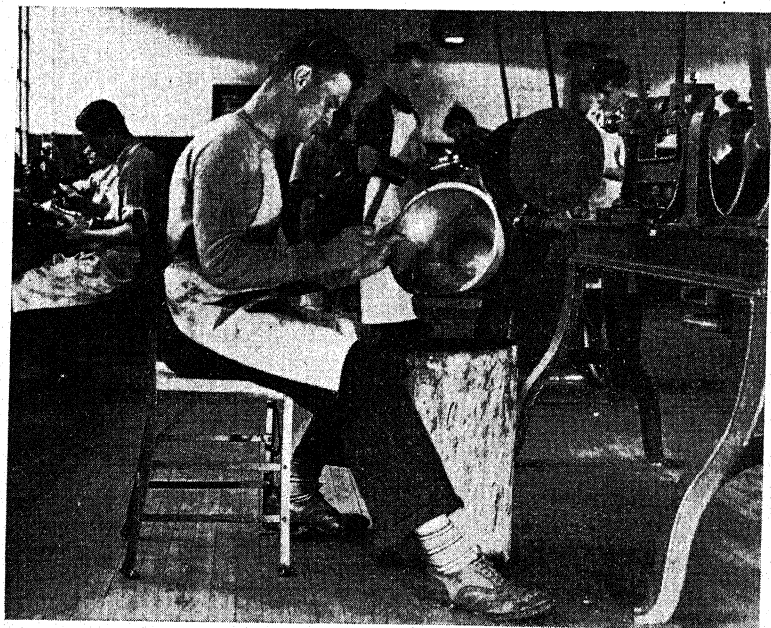
Discipline means training. A "well-disciplined outfit" in the army, a "smart ship" in the navy, are models for the instructor. In them the men are alert, on the job, efficient, neat, prompt, and always ready to do more than the letter of regulations requires. Their morale is good. Punishment is practically unknown in groups of this type.

Good classroom discipline has for its principal goal efficient learning by the students. At its best, this involves self-discipline, self-training, of the highest order. The teacher cannot learn for the student. The student must keep himself on the job. He must know when he is not making satisfactory progress and try to improve. The objective of a course is not merely to pass an examination but to acquire knowledge, including methods of learning which will continue to be used long after the student has graduated from the classroom.

The evidences of good discipline in the classroom are, on the part of the students, eager attention to the work in hand, whether it be listening to a lecture or using a sledge hammer in the shops; initiative in seeking understanding; and courtesy to each other and to the instructor. The instructor, on his side, is attentive to the needs of the students, efficient in the way he meets their questions, and courteous in all of his relations. The infamous Colonel Martinet, who exalted detail

and rigidity, was probably not a good instructor, for he certainly forced his men to pay more attention to the manner than to the means and the end of action. On the other hand, the officer or teacher who allows sloppiness and inattention is not a good instructor either.

The instructor who has the best type of discipline in his room is marked by several characteristics. He likes his students and is interested in them as people and as learners. He wishes them to do well in his class and later, and is willing to devote himself to helping them. He has self-confidence based



Busy and interested. (Courtesy *Meriden Trade School*)

on knowledge of his subject. He has enthusiasm and a sense of humor but also the willingness to be firm when firmness is necessary. He has a good well-modulated voice and a clear enunciation so that men are able to hear what he says. A great disciplinarian, Admiral Sims, summed up his success in training gun pointers in the statement, "I worked very hard for them and they soon began to work for me."

Prevention of disorder and correction of disorder, by punishment if necessary, are parts of good discipline. Human beings are perverse enough, human enough, to relax and make trouble on occasion even when it is to their own disadvantage. Men who have been well trained and have given no trouble in the past are quick to try out the authority of a new officer or a new teacher. If he is not just as quick to exercise his authority, the tendency to disorder grows by leaps and bounds. It is far easier to keep control than to regain control of a class or a runaway horse.

Class understanding of rules and their purposes and class agreement on standards of order are necessary preliminaries. Rules should be kept to the minimum essential for efficiency, but administrators often impose additional rules from above. All rules, whatever their origin, should be discussed with the class at its first meeting. The purpose of rules is usually easily made evident, and agreement to them readily obtained. Suggestions from the students as to extra rules and as to possible eliminations should be given weight. Cooperation is often a synonym for discipline.

The causes of disorder must be known if they are to be countered before trouble starts. Far and away the most frequent cause in the classroom is boredom. Experienced teachers giving advice to new instructors on classroom dis-

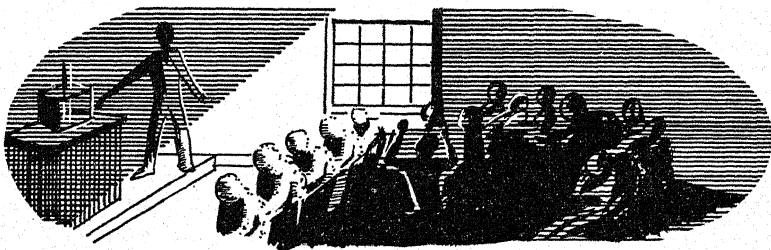
cipline always say, "Keep the students busy and interested." Boredom may set in because a subject is too easy to hold attention, or because it is too hard to be understood. It may result from poor teaching on the part of the instructor. If he cannot be heard, if his lecture is dull, if his questions are confused, if he gives a demonstration most of the class cannot see, attention is bound to wander and talking to start. Soon the room will be more like a gala night at a night club than a serious class. When discipline is of the over-strict type students are quick to take advantage of any letdown. Some trainees, like some college freshmen, are quick to revert to the ways of their childhood when the teacher leaves the room. If a class has not learned to exercise self-control, then the teacher must keep control until they learn better.

General excitement, an approaching holiday, or an imminent athletic contest may make for classroom disorder. If men's minds are keyed up and looking forward to a coming event it is naturally harder for them to pay strict attention to the business in hand. In this situation the instructor must make allowances. If he knows and likes his students and knows what is in the wind, he can usually enter into the spirit of the hour but still keep them hard at work. A brief discussion of the outside event at the beginning of the period and a frank recognition by both instructor and class that concentration may prove difficult do lots to clear the atmosphere. In this way, it is even possible to have the men work off some of their surplus energy on the topic for the day and so learn more than they might have under ordinary conditions.

Conditions within the classroom itself are among the most frequent causes of restlessness and inattention. Overheated rooms and consequent drowsiness are first on the list; second

is lack of proper light on desks and blackboards; third, uncomfortable chairs and desks; fourth, poor ventilation; fifth, cold. Most of these can be easily and quickly corrected if the instructor will only make it his business to check on them.

Causes of disorder in individuals fall into two types. The first is temporary and includes most of the items discussed above, which can influence one student apart from his fellows. For example, a man may fail to understand what others find easy, or his chair may be too high for him, or he may be tired, or sick, or worried by some event affecting himself or his family. To spot these personal difficulties requires sympathetic understanding on the part of the instructor. The single student cannot be allowed to interfere with the rest of the class, but when his troubles are discovered the instructor can try to deal with them constructively.



Poor lighting produces restlessness and inattention.

More lasting factors in individual behavior are those of temperament and of mental ill-health. Some men seem to be temperamentally sullen and prone to anger, or timid and prone to withdraw. Even the armed forces, though the men have been given psychiatric examinations, still show a very high percentage of mental ill-health. Signs seen in the class-

room are overaggressiveness and, even more, excessive day-dreaming. Treatment of these men is beyond the province of the instructor. They should be referred immediately to a psychiatrist, or if there is not one on the staff, to the doctor. The instructor can help by sending in a detailed description with specific examples of the behavior he has observed.

Stopping trouble before it starts is the sure step in prevention. In the classroom this means that the instructor should be able to keep his eye on everyone. It is not necessary to be a gumshoe artist. It is prudent to cultivate the habit of watching the class as a whole and of not becoming so absorbed in one's own activities or in those of a particular student that sight is lost of what the rest are doing. A smile or at most a word will recall a student who is looking out of the window or reading ahead in his text or trying to catch the attention of a neighbor.

When disorder does get a headstart, the instructor must act quickly and firmly. Firmness depends upon knowledge of one's power to carry through an action and the determination to do this. It follows that an instructor must know the extent of his authority and the possibilities in the way of penalties which he can impose. Bluff or any action which must be reversed by higher authorities leaves the teacher in an untenable position. If the type and extent of punishment which the instructor is allowed to use are not known, advice on these points should be immediately sought.

Threats, scolding, and the use of shaming and sarcasm have no place in the classroom. A threat does not in itself hurt a student and he is quick to realize this. Moreover, it may be impossible or at least extremely inconvenient to carry out. And an unfulfilled threat, like a called bluff, destroys

authority. Threats, sarcasm, and shaming destroy the good relations of student and instructor. They breed dislike and so create an atmosphere adverse to learning. The student who has been scolded does not study harder. Rather his resentment crowds out all thoughts of what he should be learning and he is likely just to sit and look at his book.

Possible punishments generally come under the following main types. The student may be *removed from the situation*; specifically he can be sent out of the room and told to go to his quarters or to report to a higher authority. This is rarely used in training programs, but it has the great merits of being immediate, of removing a disturbing influence, and of giving both student and teacher time to think of the next step. The student may be *deprived of a privilege* like liberty over a week end, use of the canteen, or a position of honor. The student may be given *extra work* like guard duty, kitchen police, or extra study assignments. The student may be required to *rectify* a mistake he has made, for example, to pay for a window he has broken or to go back downstairs and march up in the regulation manner instead of running. An enlisted man can be *confined to quarters or the guardhouse* for a longer or shorter time. The student can be *finned* so much pay. The student can be *put on probation*. He may be *discharged*. In the services, many of these penalties are governed by official regulations and can only be administered by a commanding officer or a court-martial. In industry and in schools of all sorts there are also often policies which have been laid down about punishments. The instructor must be familiar with the regulations and, as was said above, never impose or threaten a punishment beyond his province.

Punishments vary greatly in their effectiveness as pro-

moters of good discipline, and the same punishment can be greatly affected in this regard by circumstances. Criteria for wise use are that the punishment be immediate, that it "fit the crime," that it be not harsh or cruel, and that it leave no bad aftereffects, mental or physical. Removal, deprivation, and rectification most often fulfill these conditions; extra work, fines, and confinement least often. Probation and discharge are in a class by themselves and are only used as a last resort. A system of demerits which are assigned in accord with a code is generally worse than useless. They set a price on an offense which appeals to a man's gambling instincts. If it costs ten demerits to be caught playing poker after taps—"Well, isn't it worth it? And we probably won't be caught anyway." Demerits have the further disadvantage that they are usually worked off long after the offense and so are ineffective in preventing repetition, because not closely associated in the man's mind with his fault.

The relations of an instructor and a student after punishment has been administered are as much an influence in obtaining good discipline as the punishment itself. The instructor must bear no grudge. It is generally wise not even to mention the matter again. The time to be sure that a student knows why he is being punished is before it is administered and not afterwards. When the man has paid the penalty he should be treated like any other individual, "only more so." The teacher should go out of his way to include him in recitations and discussions and to hear his suggestions and in general should treat him with good-humored courtesy. Remember that if a punishment has not brought about correction or a change of heart, repeated punishment or any continued show of disfavor will almost surely fail also. A man who does

not reform quickly probably suffers from some disability which penalties will not cure and may aggravate. If kindness and a long-range constructive plan do not bring a change, the only recourse is to refer him to the medical staff or to a higher authority with the request that he be shifted to another instructor or dismissed.

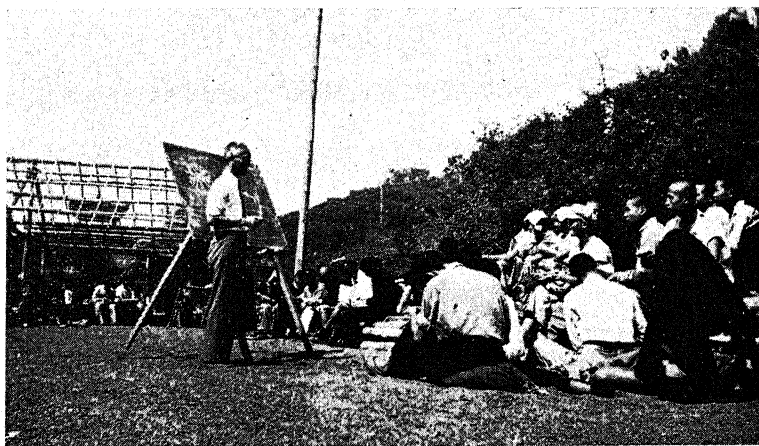
Classroom Equipment and Its Use

The legendary American classroom is a log. And the ideal American college has been described as a log with Mark Hopkins on one end and Mark Hopkins on the other. In other words, a good teacher and a good student do not need elaborate equipment. Mark Hopkins, however, would certainly have made the best of his log whether it was to use the tree rings to demonstrate effects of climate in a meteorology class or the log itself to demonstrate the fulcrum in a science class.

Classrooms and their equipment the world over, even the classrooms improvised for temporary army camps, are so much alike that there is a real danger of accepting things as they are without thinking of possible rearrangements and additions. The new teacher, even if he has studied educational methods, is quite likely to succumb to the environment and teach just the way he was taught years ago. This may have been a good way, but it should not be adopted without conscious analysis of how it serves the purpose of the course he is managing.

The details given below may seem to be of more concern to administrators than to teachers, but teachers are often consulted about plans and sometimes can take the initiative in making changes. They should be familiar with the best standards and they should keep notes on what they would

like to have in their own rooms if they were given a free hand. Many times a teacher will be called into a conference with a classroom designer and given about five minutes to make suggestions. Wise action is based on thorough preparation.



Elaborate equipment is not necessary: Dr. Lu Hui Lin teaching a class in physics during an air raid alert at Yali, Yuanling, China.
(Courtesy *Yale in China*)

A classroom that is satisfactory for most courses measures 28' long, 20' wide, and 11' high, with a capacity of about 35 men. This allows the customary 15 square feet per man. The long axis of the room parallels a corridor. Two doors, one in front and one in back, open out into the corridor, with the arc of each opening toward the nearest exit from the building. This allows ease of circulation, prevents jams in case of a panic, and automatically directs people to the stairs in case of fire. Windows fill the long wall across from the corridor.

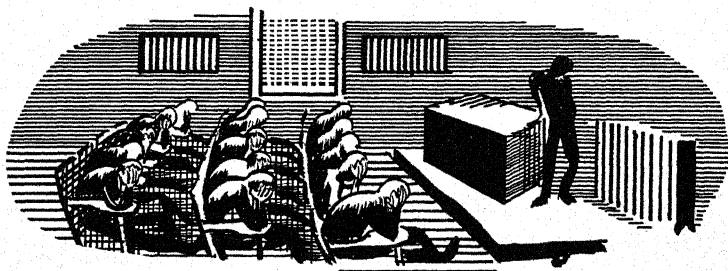
If they are carried close to the ceiling there is generally ample natural light on the desks furthest from the windows. Windows have shades to exclude direct sunlight and to darken the room for picture projection. If the main axis of the building is north and south, so that the rooms are lighted from east and west, more rooms are glare-free and the problem of heating the building adequately and uniformly is greatly simplified. It is desirable to have floors covered with linoleum and ceilings with acoustic celotex. The decoration of the room should take into account the best color combinations for sight-saving, but it need not be dull. A good color combination is dark green to the level of the chalk board, a light-green chalk board, ivory walls, a light ceiling, and light woodwork.

The lighting of a classroom is a real factor in efficient learning. Some of the points for which a teacher's second nature must be responsible are the adjustment and readjustment of shades to admit the greatest amount of light but to exclude glare, turning on artificial lights when they are needed, turning lights on or off to secure the clearest illumination of the blackboard, and arranging seats so that individuals have the best possible conditions, e.g., left-handed students with the light from the right and those with poor vision in seats near the board.

A lighting engineer will be sent gladly and without red tape by the lighting company to survey conditions in training stations served by commercial power plants. Company engineers are also available to help plan new classrooms. In general, lighting plans should provide at least fifteen foot-candles on each desk and a room lighted without great contrasts of light and shadow. Light on desks can be meas-

ured by a foot-candle meter available on loan from power companies. Lights in new installations can be automatically controlled by photo-electric cells.

Ventilation and temperature require of the teacher a second nature even better trained than lighting does. Students who cannot see may complain. But students and teachers together grow peacefully more drowsy as the room atmosphere becomes hotter and thicker. Thermostatic control of room temperature must be room by room, and even so it is extraordinary to find a system which provides quickly enough for the changes in different zones in the room. A system for a whole building controlled by a single thermostat is worse than useless. The best air is usually found in rooms which depend on gravity ventilation. In its simplest



Students and teachers grow more drowsy as the air in the room becomes hotter and thicker.

form this is merely windows open at top and bottom. A draft-free improvement is to have a vent opening in the base of the inside wall of each room and a glass ventilator shield at the base of each window which deflects the cool air upwards.

A check on temperature and a critical sniff of the atmosphere should be inviolable routine at the beginning of each

hour. A thermometer on the teacher's desk will be about at the level of the students. Placed there it serves as a reminder. Sampling the atmosphere is best done, like wine tasting, by means of contrast. Take a breath in the corridor or at an open window and then a breath in the room. The difference is often disgusting.

Modern materials and designs have been too little utilized by those responsible for planning school buildings. Teachers who are consulted by administrators should be aware of desirable departures from tradition. For example, there are many possibilities in one-story prefabricated buildings whose main natural light comes from skylights. The services of a good consultant should be recommended in connection with any new layout of educational facilities or of any alterations. Most state departments of education, Teachers College of Columbia University, and the educational departments of many other universities have men who have specialized in school construction whose services can be secured. One educational consultant found a plan for a \$500,000 government building, drawn by commercial architects and personally approved by the officer in charge of a training section, which showed on different sheets the main entrance and men's toilet in the same place.

Equipment in the classroom usually includes a desk and chair for the teacher, chairs and desks for the students, and a blackboard. There is sometimes a clock which teachers occasionally use to be sure they start and stop on time and at which bored students take surreptitious glances.

Additional equipment which is desirable in all classrooms includes file cases with locks for records, a cabinet for the teacher's coat and personal belongings, coat closets built into

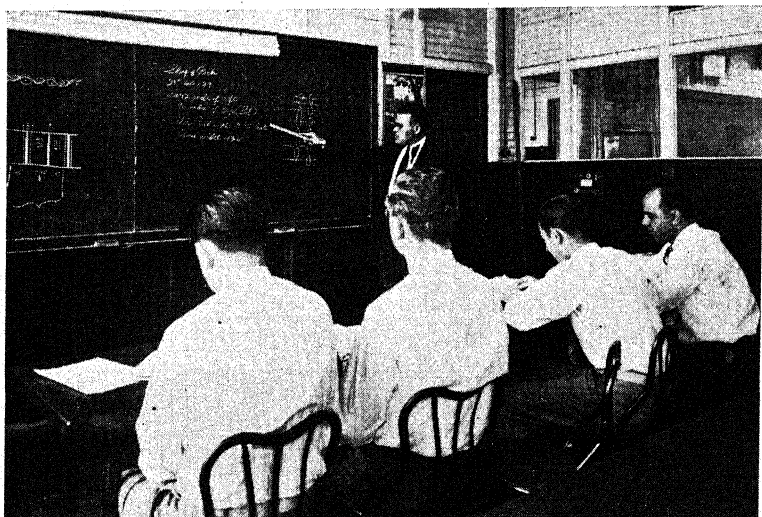
the wall and ventilated by air moving out of the classroom (or coat lockers in the corridors), bookcases, a library table, a magazine rack, a bulletin board, projectors for sound and silent motion pictures, for slides, still pictures, and slide-films, rollers for maps and charts, and showcases for exhibits.

Special equipment and apparatus need to be provided in many courses. The obvious example of this is the science laboratory, which is used for instruction in one or, at the most, two subjects. Special rooms for each subject and, if possible, for each instructor offer many advantages. If, for example, one room is used for history and for history only, it is feasible to provide it with the needed maps. If each instructor has a room of his own, he is more likely to build up a personal collection of materials and apparatus which will enrich and enliven his teaching. Careful attention by administrators to the details of schedule planning makes special rooms possible in a surprising number of instances.

Room supplies vary to a large extent. They are, in general, cheap, and imagination, ingenuity, and constructive suggestions from teachers will improve them. They should include at least paper of uniform size for students' use in the classroom, extra pencils, ink, a box of white chalks, a box of chalks of assorted colors, a blackboard drawing set, erasers, a yardstick and a twelve-inch rule of good quality, shears, paste, paper clips, and thumb tacks. Blocks, modeling clay, and actual models of ships, trucks, or other equipment are all helpful. Instructors at the Sperry Gyroscope plant have made their yardsticks easier to use by screwing small door handles to the center of one side. A piece of string attached to a piece of chalk makes a possible blackboard compass.

The blackboard can be a real asset in class instruction. It

can also be an actual handicap. It ought to be kept clean, which means that it must be washed once a day and cleaned with erasers at the end of each hour. Instructors who share a room should confer before putting on the board materials to be kept over from period to period or day to day. It is not unusual for an instructor who has planned to send all of his



Using the blackboard. (Courtesy Connecticut State Department of Education)

class to the board to come into the room and find it covered with elaborate drawings clearly marked "PLEASE SAVE." If there is not ample board space, drawings like this should be made on large sheets of wrapping paper and pinned up when needed.

Work that is to be put on the board for use by a class

should be put there before the class begins. If this is impossible, be sure that the class is kept busy at an assigned task during the time the teacher is busy at the board.

Talking to the blackboard instead of to the class is one of the frequent sins of teachers. This is most likely to happen when the teacher is writing something on the board. It places his shoulders between the board and the class so that they cannot see what he is writing, and it makes it hard for students to hear. It always results in inattention, and may result in actual disorder. It causes an extra loss of the time necessary to warm up the class again. Putting work which requires much writing on the board in advance is the best way to avoid the danger. Another way, useful in some circumstances, is to have a student secretary who writes on the board at the teacher's dictation. For example, when it is desirable to make a list of questions asked by the class, a student can write these down while the teacher is eliciting them from the class. A bright student can copy work onto the board while the teacher holds conferences with individuals and the rest of the class studies. Care should be taken, however, not to handicap one student, even for the benefit of the group.

The blackboard has many uses in instruction. The underlying principle is that it allows the student to see as well as to hear. New technical terms, and unusual words of every type, should always be written on the board at their first use and once or twice later. When a student has misspelled a word it is profitable to write the wrong form on the board, cross it out, and write the correct form beside it. This should be done only when the mistake has been made.

Sending students to the board to work problems is an old

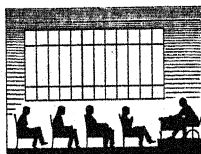
technique that can be adapted to new uses. It puts the men selected on their mettle before the class. It gives everyone a chance for a detailed comparison of methods and results. It is one means of securing time for conferences or for work with individuals. The dangers in the method are the time it takes and the tendency of the teacher and other students to leave all of the work to those at the board.

Different arrangements of classroom furniture are required by different courses and different purposes. The common pattern of the teacher's desk in front-center, with students' desks in straight rows down the room, is adapted to a lecture, provided that every student can see and hear the lecturer. An instructor who does most of his work by lecture in a room with fixed furniture, may have his desk raised on a low platform. In groups of not over twenty-five men it is often possible to place the furniture in a circle so that everyone can see and hear everyone else. This is good for a lecture and very good for a discussion. A course which makes much use of the blackboard needs a chair arrangement which lets everyone see the boards without obstruction and in a good light. Assuming a standard room with windows on the students' left, one possibility is to place the teacher's desk in the front of the room well over to the students' left and to have the students' desks in rows facing toward the right-hand front corner of the room. This keeps the teacher's desk from blocking the view and avoids students' having to look into the strong window light when looking at the boards. A good arrangement for debates and discussion is to have the students' seats in rows on opposite sides of the room and perpendicular to the windows. This reverses the old country-

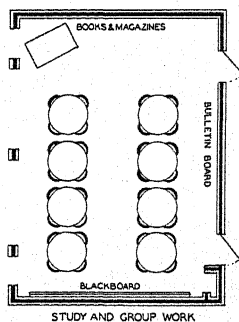
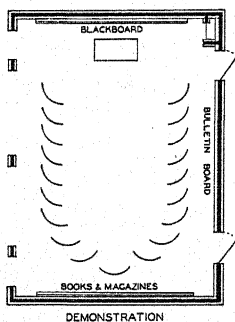
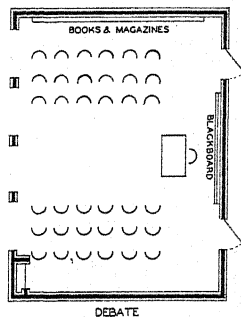
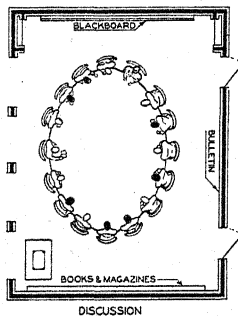
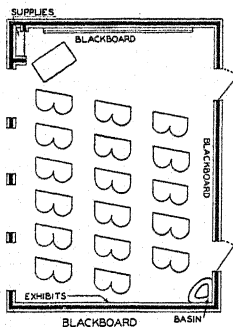
school system of students on stools working at a shelf around the walls so that they could see each other only with difficulty. In the ordinary classroom, the best arrangement for any kind of demonstration is a U with the equipment to be demonstrated just outside the open end.

Movable furniture has many advantages over the old-fashioned screwed-down type. It can be quickly arranged and then rearranged in the pattern most efficient for the immediate purpose of the class. It can be moved to suit individuals. Separate tables and chairs make the best type of movable furniture. Each unit is light enough to be handled easily and quietly. The tables can be pushed together to form a conference or demonstration table. The chairs are available separately when they are needed. For example, when two classes combine to see a motion picture the desks can be moved to one side or out of the room to make space for extra chairs which the visiting class can bring with them. Separate chairs to go with tables for two, four, or six are also convenient. Tablet armchairs are inexpensive and light. Benches and single-plank tables accommodating several students are at least better than fixed desks. Desks and chairs built into a single inseparable unit are but little better than the screwed-down type.

Adjustable furniture is more trouble than it is worth in classrooms for adults. It is expensive and gets out of order easily, despite the claims of the salesmen. In classrooms used by different sections, it is absolutely impossible to meet the needs of each individual each time sections change. The answer is to provide a large majority of the standard sizes, i.e., of chairs with seats 17" and tables with tops 29" above the



LECTURE

DEMONSTRATION
AND LECTURE

Possible arrangements of classroom furniture.

floor, with a few one inch lower and a few one inch higher. It is better for health and posture to have chairs lower rather than higher than the exact fit. The rule is that with the student sitting in his chair with his feet flat on the floor the line from his knees to his thighs should slope slightly down to the thigh.

The bulletin board, the bookcase, and the magazine table are much-neglected instruments of instruction. The bulletin board should be on one side of the main door to the room. It should be at least 30" wide by 24" high and can profitably be wider still. Insulating board or soft wood, framed or unframed, will do. Cork is not good because it crumbles under much use. The bulletin board is not a filing place for an out-of-date Red Cross poster and a dust-begrimed list of fire stations. Rather it is a live instrument in good teaching. A supervisor who finds on a bulletin board pertinent clippings from current newspapers, pictures cut from this week's "Life," samples of outstanding work by students, a chart of reference reading kept by the students, and notices put up by the students themselves, has no doubt about the excellence of the instruction given in that room. One writer states that the bulletin board is a medium for improving motivation, student activity, and general morale.

The bookcase with reference and general books, and the library table with current professional periodicals are aids in instruction which only those who have used them can fully appreciate. They can change a course from a cut-and-dried exhibition of erudition to a human series of discussions. Many students who have been promoted from a course in a standard room to a seminar in a professor's book-filled office can testify to this. Books and magazines are also useful in

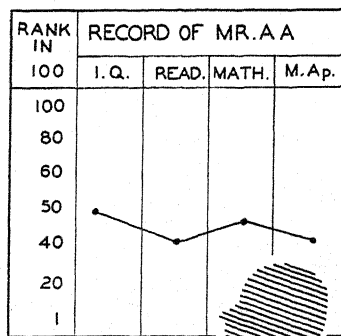
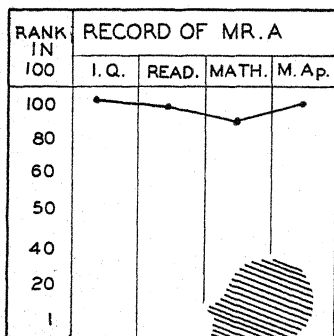
showing students the breadth and depth of the work done in a subject. They suggest extra reading. They serve as sources during the period. A teacher who has students of a wide range of abilities can often stock the bookcase with books of varying degrees of difficulty. This is particularly useful when it is possible to assign study periods as part of the regular class period.

Providing for Individual Differences

No two people, not even identical twins, learn anything at exactly the same rate. The most easily illustrated cause for differences in learning speed is that of differing past experience. All of the students in a class in, let us say, mathematics have somewhat different backgrounds. One will have clerked in a store and be a fast, accurate adder. Another will be the son of an engineer and know how to use a slide rule. Another will be the son of a poet and perhaps have the idea that he has not inherited a mathematical mind. And so on. In emergency training programs there are often great differences in the quality and in the amount of previous education the men have had. There are even greater differences in intelligence, in the capacity each has for learning, and in temperament, for example, in the ability to buckle down and labor at a hard mental task without letup or discouragement.

There is a false but comforting myth that when a student finds one subject hard, he finds another easy, and that individual differences are automatically cared for by a student needing for his hard study the extra time he saves on his easy subject. Even a casual examination of school records explodes this theory. In a majority of cases a student who is good in one subject is good in all subjects. Moreover, careful measurements show conclusively that men of above-average

intelligence are more likely to be above average in physique also. The spindling infant prodigy who grinds at his books because he cannot stand up in a football game does exist, but he is the exception. He is, in fact, just another example of an individual who needs special provision made for him if he is to develop into a well-rounded human being.

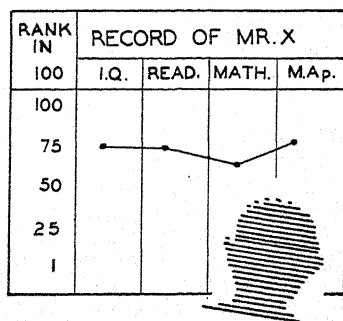
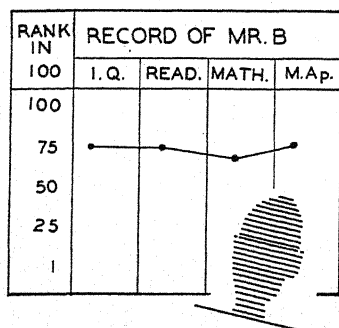


No two people, not even identical twins, learn at the same rate.

Some adjustment for individual differences is automatically provided in the classroom by the way in which students vary in the level of their understanding of a lecture, in their contributions to a discussion, and in general in the extent of their participation under any method. Two men can both pay strict attention to an explanation and understand it satisfactorily. But one of them may carry away only enough knowledge to repeat the explanation. The other may go far beyond that and connect the facts under discussion with others learned elsewhere and be able to suggest improve-

ments in the process explained. But it is better not to trust to the chance that each man will profit as much as he can.

Definite means of helping each individual to make the most he can of his time in a course all have their foundations in a thorough knowledge of each student on the teacher's part. Experienced teachers start with an advantage in their knowledge of types of students and of what attitudes to ex-



Differences in people do not necessarily mean differences in aptitudes.

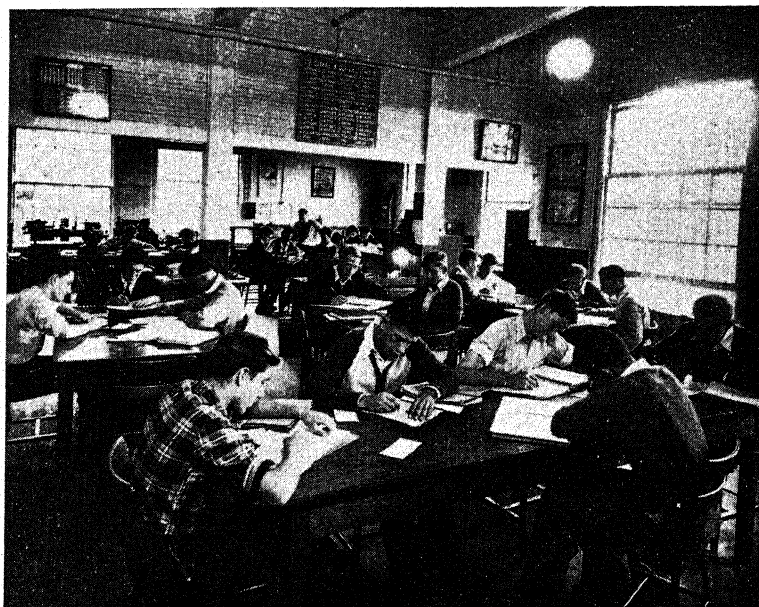
pect from residents of different parts of the country and from men of different ages. Some knowledge can be acquired by a careful study of the students' records, particularly of their ratings in intelligence and achievement tests. More will come from the teacher's own early contacts in class. Still more will result if it is possible for him to hold a series of private conferences with each student. These will help the student and instructor to know each other, and so establish feelings of trust and friendship which are a great source of strength when departures from routine are suggested or required.

Conferences even before the formal start of a course, or at least soon after it is under way, not only help the teacher and student to get together but also may afford an opportunity for the teacher to suggest special lines of procedure to those who will profit from them. For example, the instructor in navigation may be able to show one student that he ought to start immediately to review trigonometry. To another who obviously has a sound knowledge of mathematics and some experience in celestial navigation he can explain the limitations of the course and suggest some advanced reading. Another, who may seem overconfident, can be brought firmly to earth and given an idea of how hard he will have to work.

Conferences continue to be one of the best means for adjusting course work to the varying abilities and progress of students. They allow the teacher to explain to the slow student again and over again principles which the rest of the students have grasped so firmly that it is unfair to take any more class time on them. Students whose work is not up to anticipations can have their problems thrashed out and the cause of their difficulties discovered. The good student can be led to discuss the subject on a professional plane and to undertake special work. This instills a pride which may well inspire him to superior achievement.

Classroom provision for individual differences is best made through some plan for semi-independent activity. By "semi-independent" is meant any activity which the student carries on alone or with a part of the whole group while others are similarly engaged. The teacher, instead of being the focus of combined attention, supervises the work of all and, as he is needed or as occasion offers, gives specific help to the individual or to two or three who happen to be working together.

Supervised study is perhaps the simplest illustration of semi-independent activity. Under this system part of each period or of occasional periods is set aside for study by the students. They are free to come to the teacher's desk or to raise a hand and have the teacher come to them whenever they need help. Even when all are using the same textbook and have started at the same page there will be great differences in the ground each covers and the problems on which help is needed. Students will raise questions under this system that they hesitate to ask before the whole class because they are afraid of being laughed at either for ignorance or



Supervised study. (Courtesy Connecticut State Department of Education)

for being highbrow. So the teacher's knowledge of the individual and of how to help him to do his best receives reinforcement.

Class reference work is an elaboration of supervised study. It is best carried on in rooms which have sufficient reference books to keep all of the students busy, but it can be done when only standard texts are available. Class reference work, as the name implies, consists in students looking up references during class time. The references may be connected with problems which have been raised in previous class discussions or the teacher may assign problems of his own choosing. In the latter case he can match his assignments to the needs and capabilities of individuals. For example, a man in an artillery class may have shown that he was ignorant of interior ballistics and can be helped to help himself by being given a problem which involves the speed of burning of powder. Class reference work has the great advantage of allowing the teacher to check personally on the way students go at solving problems. Nine-tenths of the use of books by professional men is in reference work. Training in correct method is thus extremely important.

Work sheets are another means of allowing men to work at their own speed. Printed or mimeographed sheets which contain assignments, problems to be worked, references to be looked up, and often tests to be taken, are passed out to the students. The work required is planned to cover a wide range, that is, to start easily but to contain more material of a greater degree of difficulty than most of the students in the group can be expected to complete. This means that every man has material to keep him busy all of the time and that each can advance as far as he is able. The teacher, of course, is in the room and available to help single students or

small groups. One of the plans just described is often the only way by which the teacher can make time for conferences.

Common problems will be noticed by the alert teacher in charge of a class under any of the above plans. If he finds a matter which is troubling a great majority he secures the attention of the whole class and takes the time of all while the matter is explained. This means that he shifts to group instruction. If he notices a problem common to a small group, two or three men or less than half the class, he can explain it to this group while the others continue on their own. It is remarkable how quickly a class becomes used to this splitting up and how easily those who are not receiving special help learn to concentrate on their own tasks.

Having the better men help the poorer is possible and desirable under any system of semi-independent activity. It makes it possible for the poorer men to get more individual attention, more detailed explanations, and more drill. It cements the facts in the minds of the better men, for there is no way of learning a subject quite so efficient as teaching it. Moreover, it gives the better men valuable experience in drilling others and in leadership.

A system of flexible assignments, that is, one which allows the instructor to require one student to read more than another, is a possible solution of the problem of individual differences. Many administrators and students and, it must be admitted, teachers themselves think this unfair. Why should one student be required to cover more ground than another? The answer is twofold. The nonflexible assignment requires much more work from the slow student than from the bright, and can thus be said to be unfair in itself. The better answer is that it is unfair to the bright man, and in a way unfair to

the country which needs to have its bright men given as much advanced training as possible, not to demand of him all he can do. Work that is too easy not only keeps a man from progressing as far as he might; it actually bores him and may result in a lasting distaste for a subject.

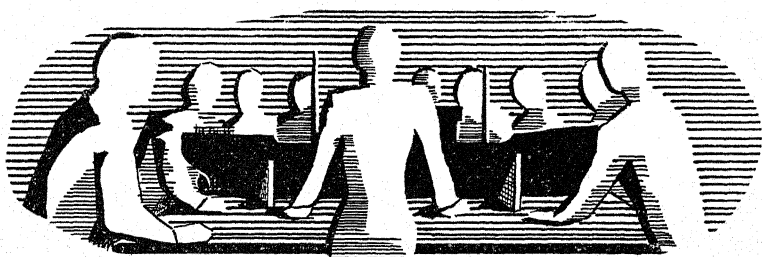
Ways of varying the amount of out-of-class work required of students include variations in supplementary reading, required essays, special problems, and special projects. In a course in military tactics, for example, the good student can read both a book by Liddell Hart and one by Clausewitz, while the poorer student reads only the former. All students can be asked to write essays on the development of tank warfare, but the better students can be told that in preparing their essays they should consult certain technical works, while the poorer student can be left to struggle with the article in an encyclopedia. Problems for written solution can be assigned according to difficulty. In definite projects like field maneuvers the better men can be given more responsibility and positions of leadership.

Extra credit is often given for any work over and beyond the minimum requirements of a course. When future ratings and assignments depend upon a man's standing in his class, it is only fair that he have extra credit for extra work. It is often better not to hold out the promise of the extra credit but to let the final mark take into account not only daily work and examination results but also intellectual initiative and achievement over and above requirements. A student who studies to satisfy intellectual curiosity stands more chance of doing well in life than one who only works to win some extraneous reward.

Teaching Students How To Study

Efficient study depends upon ability and habit. Teaching anyone how to study is a process of helping him to cultivate to the best of his ability habits which are in accord with the laws of learning.

The first law of learning to be considered in connection with study is that the student must be interested in his work or at least determined to learn. No one has trouble concentrating on a novel or biography or technical book in which he is really interested, and, granted sufficient ability, no one



No one has trouble studying a subject which appeals to him.

has trouble studying a subject which appeals to him. The teacher can be of help here by presenting his subject from the very beginning in ways which catch and hold student interest. He can correlate the daily classwork with outside study in such a way as to leave a carry-over of interest in the students' minds. The simplest way of doing this is to list

questions growing out of the classwork to which students are to find answers before the next class. Similarly the student can make a list for himself of questions to which he hopes to find the answers in his reading. If the textbook starts each chapter with a series of questions he can examine these carefully and try to answer them for himself. This will put him on the alert to see what answers the author makes and so give him purpose as he reads. No one goes to sleep while looking up a word in the dictionary.

Determination to learn does not rule out interest, but in an unfortunately large number of instances determination must stand by itself. If we know that something has to be done, whatever the reason, we are likely to try to get it out of the way whether it be taking castor oil or learning a long list of dates for an old-time history professor. When someone says of a teacher, "He taught me to work," nine times out of ten he means that that teacher would take no excuses for lack of preparation. Insistence that assignments be well done and penalties for any lack of effort on the students' part are immediately efficacious, though the results in long-term memory and use of the knowledge acquired are less certain. The teacher can also promote determination by making clear to the student that the study he puts on a subject now will be useful later. This is a better approach than the hard-and-fast requirement, though the requirement and the accompanying penalties for failure must be instituted if other methods fail.

Understanding is another part of learning which plays a big part in efficient study. As soon as one's mind ceases to follow what he is reading, he begins to nod or at least to daydream. Reading without understanding seems to hypnotize the mind. When this happens it is possible to read a

page over and over again without retaining any conscious glimmer of what the words mean. On the other hand, once a thought is thoroughly understood it is learned and learned "for keeps."

Understanding as it relates to study is made up of a thorough grasp of fundamental principles and practices involved in the new knowledge, of knowing the meanings of the words used, and of a vision of that whole of which the new knowledge is a part. A mechanic who is studying directions for sharpening a gouge should already know how to use a stone, should understand the words "stone," "basil," and "quicken," and should know how the gouge is used in woodwork.

The teacher can promote understanding by going over in advance with his students the materials they are about to study. One of the great teachers of all time, St. Ignatius Loyola, required all who taught according to his rules to go over the advance assignment with the class. The teacher who does this can make clear the meaning of words which are to be met by the students for the first time. He can review with them the fundamental processes involved. He can relate the assignment to past and future lessons. When it is obvious that a student has not the background to study the new assignment effectively he can direct that the information needed be studied first, or he can actually change the assignment. Such advance explanations need in no way interfere with independent study and initiative.

Students can sometimes help themselves toward understanding by making an outline of what they are reading. This procedure is certainly helpful when the subject matter is complicated. Outlining shows the relation of ideas to each other and makes clear the steps the author took in building

up his conclusion. Making an outline, even when the thought of a chapter is easy to follow, helps to keep the reader's mind from wandering. This result is enhanced if the reader will try to forecast for himself the next steps he believes the author will take. Sometimes it is wise to make actual written note of a forecast. If it is correct, there is a valuable sense of satisfaction. If it is not, understanding is promoted by reasoning out where the difference arose.

Satisfaction is one of the strongest influences in establishing good study habits. We all like to do things we feel we do well. We like to make progress and to achieve results. We like to feel that we have gotten our money's worth. On the other hand, constant failure discourages effort. A feeling of continued failure in study creates a feeling of its uselessness. It drives the student to take refuge in daydreams and may tend to establish daydreaming as a habit.

The teacher's part in giving his students a feeling of satisfaction in study is largely to give praise where praise is due. Many a fair student can be made a good student by a teacher who praises a lesson well done rather than taking the accomplishment for granted. And poor students can be helped if the teacher will take time to find out how hard they have worked, what progress, however slight, they have made, and what special knowledge related to the subject they may have. To praise sincere effort does not mean that a student has to be given a mark he has not earned. But effort once praised is likely to be redoubled and to begin to bring success. In this case, increasingly good marks should show the improvement, and are in themselves worthy of encouraging comment.

A good means of noting progress and increasing satisfac-

tion in study is to post on a bulletin board a record of work done by different students, e.g., of books read, of experiments performed, or of reports written. One type of record which has been found stimulating is a chart with a list of students' names and of books recommended for supplementary reading so arranged that check marks can be placed opposite a student's name in the columns under each book. The satisfaction in checking off another book is great. It is increased if the student is asked to indicate his opinion of the book by putting down "R" ("Recommended") for those he likes, and "NR" for those he does not. When differences of opinion develop, time can be taken to air them in class. It is not necessary to check too closely on the claims students may make. If anyone makes a false claim, the other students will quickly find it out and take care of the matter themselves.

Students should be encouraged to keep private records of their own progress to supplement the records the teacher keeps and the marks the teacher gives. Possible private records include those of hours studied each day, pages read each day, and correct answers to questions or problems. On the negative side it is recommended that the student also keep a running record of the number of times during each hour of study he interrupts himself or lets himself be interrupted. Sometimes it is possible to add to this a record of minutes spent in daydreaming. The total of time wasted may be impressive and the thought that minutes lost will be written down may in itself serve to halt the wandering mind.

Study habits which should be cultivated ought to be explained to all students. The explanation might well start with a discussion of the laws of learning (*see* Chapter 2) and of ways to make drill effective (*see* Chapter 17). In connection

with drill it is well to point out the advisability of taking time at the end of a period of study to summarize high spots. If this summary takes the form of an outline it can be reviewed from time to time and so help to fix its contents in the student's mind.

The place where a man studies can make a big difference. Those who are easily distracted should avoid studying where others are free to talk to them, where interesting incidents are likely to be seen, or where reasonable substitutes for work are ready to hand. One famous contemporary author works in a room at the top of his house. This room is lighted by a skylight through which no trees are visible. It is furnished with a straight chair and a plain table without drawers. There are no shelves and no books—not even a dictionary. There are no pictures on the wall, nor even a rug on the polished oak floor. The room is reached through a trapdoor by a ladder. Every morning the author's wife hounds him to his "study," and once he has mounted the ladder, takes it away.

A study hall or library where other men are working and where an official enforces silence is an excellent place to study. One precaution is necessary, that is to have at hand all of the books, paper, pencils, and other materials necessary. Errands connected with study, e.g., to fetch a book or even to sharpen a pencil, are among the most plausible time-wasters.

Heat, light, and ventilation are as important to attentive study as to attention in the classroom. A too-hot room promotes drowsiness, as does poor ventilation. Poor light hastens fatigue and may do permanent injury to eyesight. Granted

good light and a room not too hot, comfort is probably not a detriment. It is as possible to nod sitting on a bench as in an upholstered chair.

"The ability to concentrate" is largely a matter of habit. Two rules help to develop it. One is to start work the minute one sits down at his desk. Time out to sharpen a pencil, arrange papers, read a letter, or look at a book may be fatal. The other rule is to schedule a definite period for study and to remain at one's desk until the task is finished or the time is up.

A schedule which is followed closely is the best of all study habits. It should be laid out with due regard to the amount of time generally needed to get through required assignments, to other engagements, including recreation, and to the individual's own staying power. Several short periods for study are not as efficient as two or three longer periods. It takes a little time to warm up, even if work is begun immediately, and so whenever there is a break, time is lost. On the other hand, fatigue impedes learning. Probably a period of an hour and a half, or two hours, is about as long as most people work well. If there is a break during this time, if for example one has to go to the toilet, every effort should be made to keep one's mind pinned to the materials being studied. It takes determination and practice to do this, but it can be done. It helps if one leaves his work for a temporary interruption not at a good stopping place but in the middle of a sentence. The suspense this creates seems to help keep one's mind on the subject.

Reading over a page or so is a good way to take up work after any interruption, long or short, which has interfered

with the flow of one's thought. This serves to build a basis of understanding for what is to come and acts as a warming-up period.

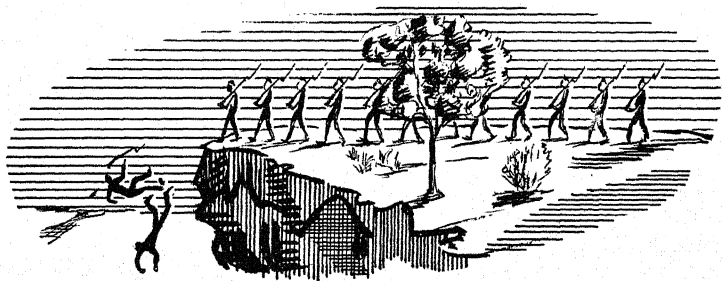
Individuals differ in the amount that they are helped to concentrate by note-taking, outlining, and underlining passages. All of these devices furnish activity connected with the material being studied. They serve as a counter to distractions, help focus attention on specific points, and aid understanding. Whether they are worth the time they take, each individual must discover for himself. In any case, certain precautions are in order. Notes and outlines, if there is any idea of using them later, must be full enough to retain their meaning but short enough to review in less time than it would take to reread the original book. Underlining passages in a book is excusable only where the book is the student's personal property. A book marked by another is hopelessly distracting to the next reader. Erasures, even of light marks, shorten the book's life.

"Effective study habits" and "how to concentrate" can be summed up by Edna Ferber's prescription for writers. She said: "The art of writing is the art of the application of the seat of the pants to the seat of the chair."

How To Make Drill Effective

Drill, repeating attentively over and over words or motions that one wishes to learn, is one of the oldest and best-tried methods of learning. In fact it is essential in learning anything which is not learned in a flash.

Repetition alone is not enough. Clergymen who have read the same prayers over every morning for years say that they



Understanding and purpose are essential if the drill is to be in line with practical use.

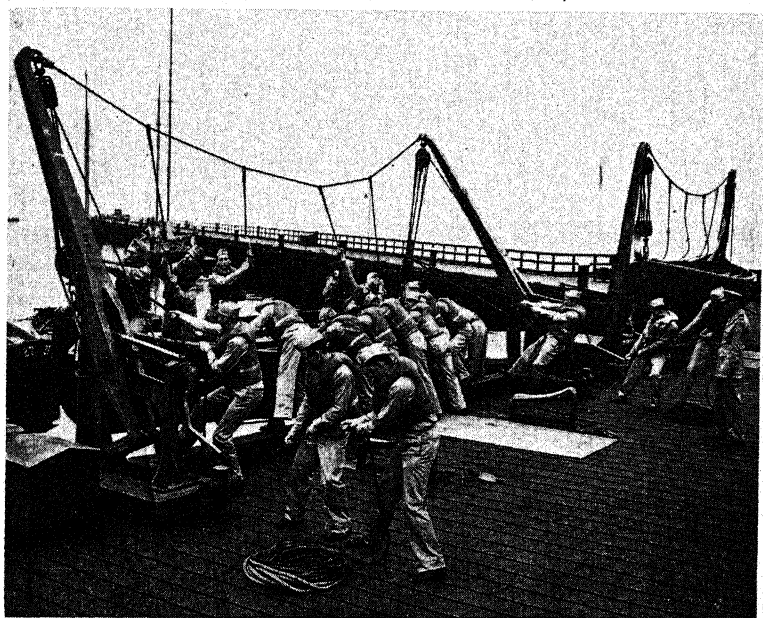
cannot repeat any of them verbatim. Boys who have been punished by being made to copy a sentence 1000 times will copy it 1000 times correctly and the next day misspell words it contained. Effective drill presupposes five conditions: desire for improvement, understanding, a good model, continuing effort, and a satisfaction with progress. A golfer who is

content with going around in the 90's will never take the lessons and put in the practice which would let him break par. To learn to send Morse code by blinker a man must wish to improve, must contrast his mistakes with a correct model, must keep practicing, and must feel some pride when the results of his hard work begin to show.

The teacher's part in conducting drill and in guiding students to self-drill consists in setting the stage so that these conditions and the other laws of learning are fulfilled. First of all, he should establish purpose in the student's mind by convincing him that the matter of the drill is something which must be learned. The anecdote of the men who went ashore on a South Sea island for a swim is a story in point. They were members of a ship's black gang and could not read semaphore. When a signalman from the bridge of the ship began to signal to them furiously they thought they were lucky in not being able to read what they guessed was a recall. The minute they landed, they were ambushed and captured. The signalman had been spelling out, "Danger. Come back. Cannibals."

Understanding is essential to learning. The easiest proof of this is to contrast the time it takes to memorize a sentence in an unknown foreign language, or a series of nonsense syllables, with the far briefer time it takes to learn an English sentence. Try, for example, to repeat without a second reading: "The-tho-the-we-lu-in-no-be-ab-to-re." Now repeat: "They thought they were lucky in not being able to read." A more practical example is taken again from learning code. No one would think of asking men to learn the dot-dash symbols for letters without explaining what the dots and dashes represent and how the receiver distinguishes letters.

Understanding and purpose are essential if drill is to be in line with practical use. Together they keep drill from being perfunctory and too automatic. Experienced gun-crew instructors are accustomed to the men who shout "All clear" even when the instructor has slipped his handkerchief into the muzzle. The men must understand that "All clear" is not just a phrase to be spoken in an obstacle race against time, but a guarantee that no bits of burning powder bag have been left to ignite the new charge. An example from civilian



The purpose of drill is knowledge in time of action. (Courtesy
United States Merchant Marine Cadet Corps)

life is the one of automobile drivers who say that they put on the brakes automatically. A man who does this on an icy road and skids over a precipice may or may not live to regret it. Instructors must guard against this lack of reasoning by providing for drill under many different conditions, real or simulated. For the purpose of drill is not perfection in the classroom but knowledge in time of action.

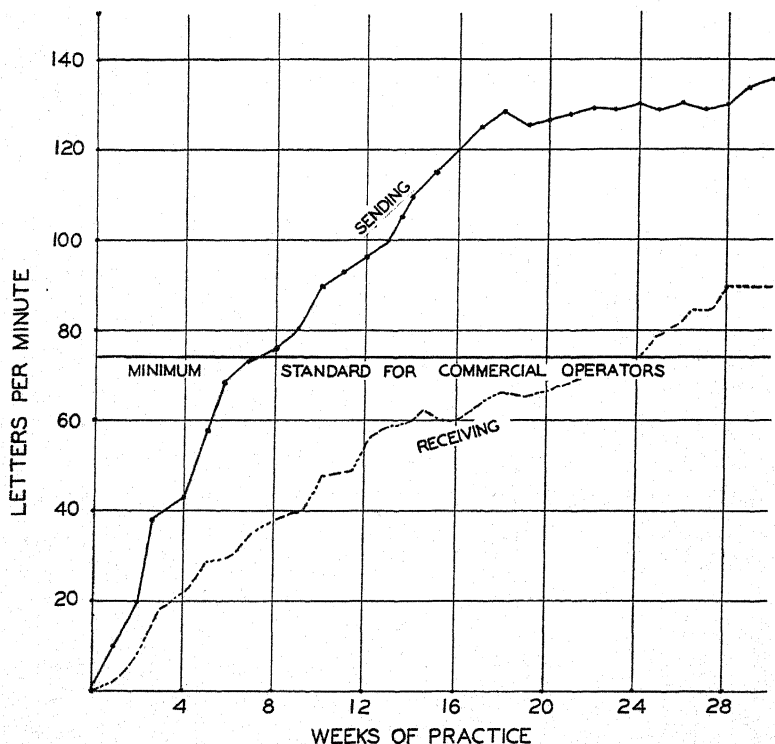
The model or pattern the student is to follow is furnished by the teacher, either in his own person or through his requirements. In any matter where the teacher can be copied directly, from handwriting to target shooting, he must be sure to set a good example. The student may soon surpass his instructor, and that to the instructor's delight, but until he does, the live actions of the instructor have far more influence than dead diagrams in a book. Moreover, it is an immeasurable help to have the instructor on hand to correct a person who is making a mistake. Unwitting repetition of a mistake is obviously worse than useless.

Continuing effort rests more with the student than with the teacher, but here, too, the teacher has a part. He can devote more class time to drill when it seems needed. He can include drill in an assignment. He can urge effort on slackers and praise those who keep trying hard. Continuing effort is not just a matter of giving time and more time, but of constantly *trying* to improve. The man who loafs through a drill is not learning as much as the man who pays strict attention to it.

Satisfaction with progress and its corollary, dissatisfaction with failure, have a cumulative effect in promoting drill. Dissatisfaction keeps one going until improvement is felt. The feeling of improvement and the hope of achieving perfection

make one work even harder, while continuing hopeless failure dulls interest and inhibits learning. When a student begins to feel "Oh, what's the use?" it is past time for the teacher's intervention. If there really is no use, of course it is a waste of everyone's time not to dismiss the student or to shift him to another course. Many times, however, a man feels discouraged and hopeless when there is in reality every chance that he will eventually be successful. It may be that he lacks the training which some of the men with whom he is associated have had. It may be that he is bright enough but not as bright as most of his classmates, or bright but a slow learner. Everyone in the course of learning a skill comes to a plateau where he makes no measurable progress and may feel that he has reached his limit. In many of these cases it is a great help to the student for the teacher to point out that a learning curve is more likely to be a series of steps than a steadily increasing curve. Other potent aids are individual correction, praise for continuing effort, and praise for improvement, however slight. The role of praise, emphasized so often in this book, cannot be overemphasized. Another way to help a man who seems to have reached his limit is to analyze with him the cause of his difficulties. It may be a lack of understanding, a lack of prior training, or some particular stumbling-block. Stumbling-blocks are frequent in the case of men learning definitions and lists of rules and can sometimes be cleared up by working out a mnemonic. Some of these seem absurd or more complicated than the simple fact, but somehow they twine themselves into a student's associations and obviate mistakes. "Port wine is red. Port light is red. Left has four letters. Port has four letters and is left."

Enthusiasm and snap, always valuable in the classroom, are a necessity in group drill. Drill functions in proportion to the attention each individual pays to detail, and enthusiasm encourages attention. Again an example is taken from code. Two officers were observed drilling different classes, both of



The learning "curve" is a series of steps: a telegrapher's curve of learning. Compare W. L. Bryan and N. Harter in *Psychological Review*, 1897, 4, 27-53.

which were just beginning. The officer in one room was asking each man in turn to give the dots and dashes for a letter. He took the letters in alphabetical order and went methodically along row after row. If a man missed, he said, "Now think," waited, usually in vain, and then gave the right answer himself. As soon as a man's turn was over, he slumped in his seat and let his mind wander. Men who had not been called upon were busy figuring what letter would match their turn.

The officer in the other room had the men all rise. In staccato phrases he said he was going from man to man. When a man missed he was to sit down and drill himself on the letter. The next man was to give the answer without waiting or sit down, too. The last men to remain standing were to be given small printed signal cards as a prize. Then he started off: "Axelson, A No, sit down; next." Soon only three men were standing. He passed out three prize cards and as he was doing it said, "Now as I call your name give me your initials in code." He called names rapidly, skipping about in the alphabet. He saw a man already called on who seemed to have relaxed, and asked him to give in code the initials of a famous general. Immediately he asked another for the initials of a popular actress.

The work of the second officer had to be seen to be appreciated. The generalizations drawn from it are that good drill depends upon a rapid tempo and shifts and novelty in devices. The attention these secure repays in increased learning by the class the drain on the teacher's time in thinking up the methods and on his energy in keeping the class moving.

Competition as a motivating force in drill should never be

ignored. It may be between individuals, between groups, or best of all between the individuals' own past and present performances. For example, where speed is an objective, it is possible to post on the bulletin board the daily record of each man. He soon begins to try to show himself and everybody how much he is improving.

Individual differences in mental ability, memory, and physique are quickly evident when several men are drilling on the same matters. These should be noticed and provided for by the teacher. It is a waste of time to continue to drill a man in a code at a speed far below his powers. In fact, learning is quicker if there is always a challenge to a man's ability. Most teachers of signaling try to send a little faster than the student can receive and so to hold his attention, to force him to recognize syllable and word groups, and, in general, to "keep him up to it."

Provision for differences can be made during a class drill period by breaking the class up into small groups on a basis of their achievement. The best can drill with the best for a while and the poorest with the poorest. Later the best men can be given charge of the poorer groups and told to drill them. This responsibility is good for the men who receive it, and at the same time the poorer men have the benefits of individual instruction.

Four problems are common in arranging all types of drill: (1) how much of the matter to be learned should be drilled on at one time; (2) how much energy should be expended in trying to remember without reference to the model; (3) how long drill periods should be; and (4) how close together drill periods should be spaced. These problems must be met whatever the subject matter, whether it be in learning the

Rules of the Road, learning a code, or learning the Manual of Arms.

Drill on the whole of the matter to be learned is recommended wherever this is possible. For example, it is usually quicker to learn a page as a whole, to read it through once and then again and again, rather than to learn it sentence by sentence. Learning as a whole poses problems of its own. First, it assumes that the whole makes sense to the learner—that he understands it as a whole and understands how the parts fit into the whole. Even so, there are some tasks so long that the parts cannot be kept in mind. If one set out to learn the whole Bible, he would not read it through and through without ever drilling on a single chapter. Certainly not. Probably the best way would be to read it two or three times and then to take a unified section whose parts were well related to each other, and to learn that as a whole. Similarly, if a person cannot grasp a whole page, he may have to learn it paragraph by paragraph or even sentence by sentence. But he should not start to do this until the whole has been understood, and he should keep in mind the relation of the part he is working on to all of the other parts.

How much effort should be made to recall a missing part or to correct for oneself a mistake before “looking at the book?” Very little, but that little honest. The essence of drill is correct repetition. Fumbling for the correct form may merely ingrain a substitute and make later correction difficult. Provided the effort to learn the whole is sincere, so that one’s mind does not always count upon a prompter, the sooner and more completely a lapse is filled in or a mistake corrected, the better. If a particular part proves hard to remember, a mnemonic will help. Some examples have already

been given. Another helps prevent an old spelling mistake: "A *principal* is a pal."

The best length for a drill period cannot be determined in advance, but in general short drills are better than long. The period must be long enough to cover a logical unit at least once and preferably several times. It should not be continued after fatigue, mental or physical, has become noticeable or interest has begun to lag. Here there is, perhaps, a distinction between drill as a means of learning and exercise as a means of toughening muscles. Learning is not efficient when the learner is tired or bored.

Frequency or spacing of drill depends upon the stage of learning. In the beginning, drill periods can be spaced as close together as rest, interest, and duties permit. Once something is learned and learned thoroughly ("overlearned" is the paradoxical technical term) drills can be spaced rather widely. But overlearning is essential. Partial learning is like a wire which is loosely connected to an electrical battery. Sometimes it functions and sometimes not. But a wire wrapped firmly around and around the battery terminal with the intention that it stay fastened makes a sure connection. When overlearning has been achieved, occasional practical use will keep the memory fresh. When current use is not being made of what has been learned, infrequent drills are all that is necessary.

Construction, Scoring, and Administration of Standardized Tests

The value of standardized tests has led to their wide adoption. All of the armed forces of the United States now use them to classify new recruits and to pick men for special training. Most of the service training schools use them in connection with admission, with guiding men into different courses, and with placing them on graduation. Lay educational institutions and industry use them for similar purposes. Obviously both instructors and students ought to know something of how standardized tests are constructed, graded, and interpreted. Such knowledge will help to make clear the tests' values and their limitations.

"Objectivity," that is, the ruling out of subjective opinion by which different examiners may give more or less credit for approximately the same or different answers to the same question, is essential to standardization. Any leeway in the matter of credit voids the validity of comparisons based on the test. Objectivity can be achieved by including only questions to which the answers are absolutely right or wrong, and by employing one of the methods which allow the student to indicate an answer without having to put it in his own words. These methods include: questions which can

be answered by checking a "Yes" or "No"; statements which can be checked "True" or "False"; questions followed by several answers which offer the student a "multiple choice," that is, the choice of the one correct answer from among the several offered; and mathematical problems which are graded only for the final answer. The following simple examples show how knowledge can be tested in various ways. "Do twelve inches equal one foot? (Check: Yes—No—.)" "Twelve inches equal one foot. (Check: True—False—.)" "Twelve inches equal one foot, one yard, one meter. (Underline the correct answer.)" " $6 + 6 = \text{———}$. (Fill in the answer.)" Another method requires the student to complete a sentence by supplying a missing word: "Twelve inches equal one——."

The choice and wording of questions to be included in a standardized test take much care. It is usually necessary to try out the questions extensively before all of the difficulties are eliminated. In the early drafts of a test it is hard not to include questions so easy that everyone can answer them or so hard that no one can answer them. Neither result offers any basis of comparison between individuals. Wording may give a clue to the correct answer: "Is not twelve inches equal to one foot?" It may also confuse the student unfairly. "Can inches be used in the metric system?" is not as clear a question as "Are inches a part of the metric system?"

A wide range of difficulty in questions, granted clear wording, makes a better basis of comparison. If the difference between a good student and a bad student lies only in answering differently one or two questions, luck might play a deceiving role, but if there are many questions of varying degrees of difficulty, the poorer student will be separated

from the better by a wide margin in the number of correct answers. It is, therefore, customary to make most standardized tests so long that only very few can finish them. Inasmuch as only the number of right answers, *not* the total number of answers right or wrong, are counted, a long test distinguishes men who can give the answers with both speed and accuracy.

Standardization of a satisfactory test is accomplished by giving it to large numbers of people and securing from them, from their records, and from other tests as much knowledge of their backgrounds as possible. All of the people who take the test are then classified in various ways, most usually by age, grade reached in school or college, number of years devoted to the study of a given subject, and scores made in other standardized tests, including tests of intelligence and in English usage and mathematics. The scores made by all of the people included in a specific classification who took the test, e.g., those in the first year of college, are then listed and averaged. Thereafter, anyone who takes the examination can be graded and compared with the various averages. If all the college freshmen's marks which were used to standardize a mathematics test average 80, anyone else, whatever his education, who later receives a mark of 80 can be said to rank with the average college freshman in his knowledge of mathematics as measured by this test.

The word "mean" is sometimes used instead of "average," and sometimes a "median" is calculated and used in place of the average. The median is merely the mark which divides the group in half so that one half receive marks higher than the median and one half lower. "Quartiles" are also used to

indicate rank in a given group. The first quartile (Q_1) includes the top twenty-five percent, Q_2 the next twenty-five percent, Q_3 the next, and Q_4 the lowest. So a person who receives a mark in the range of the top twenty-five percent of the marks in any group is said to rank "in the first quartile" or "the top quartile."

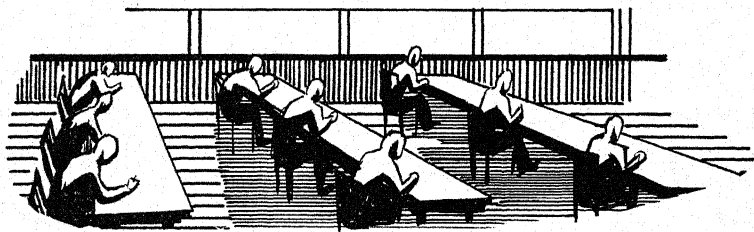
"Percentiles" are another very convenient way of rating men who take a standardized test. The publisher of the test furnishes a table which shows in what percentile any score falls. This table is arrived at by arranging in order all of the scores of all of the people who took the test during the process of standardization and then listing in the table the lowest 1 per cent of the scores as percentile one, the second lowest as percentile two, etc. The lower the percentile number the lower the rank. A percentile rank of 3 indicates that a man's score is as good as or better than only 3 out of every 100 scores made by all who take the test, whereas a percentile rank of 99 indicates that a man's score is as good as or *better than* 99 out of every 100. Because percentiles have been figured for a standard group it is possible to give everyone who ever takes the test a percentile ranking whether he takes it alone or is one of a group of less than one hundred or of many thousands. Of course, percentile ranks can be assigned to groups as well as to individuals. So in a certain mathematics test the average of high school seniors falls in the 55th percentile, and the average of college freshmen in the 75th percentile.

The advantage of percentile rankings and therefore of standardized tests which offer them lies in making it possible to rank one or two or more students in relation to a set standard. Without some such arrangement class rankings (despite

their importance in the regular army and navy) are grossly unfair. A man who ranks 2 in a group of 5 may be far poorer than one who ranks 200 in a group of 1000. Percentile ranks make it possible to compare them much more fairly. Another advantage of percentile rankings is that they give an immediate idea of a person's ability, whereas a numerical grade on an examination may be misleading either because the examination was easy or hard, or because it was marked on an unfamiliar system. Numerical grades and scores are a little like coinage—it is necessary to know the value of a nation's various units and their standing in international trade before a quotation of price in that coinage means anything.

The grading of standardized tests is far easier than that of old-fashioned examinations because no problems of judgment arise. An answer is either right or wrong and the examiner does not have to worry about details such as neatness and spelling. Standardized tests are arranged so that a key can be used in scoring them. The simplest form of key is a perforated sheet which fits over the answer sheet and has its apertures so arranged that only the right answers show through. In this type of examination it is only necessary to add up the number of marks which show. This gives what is called a "raw score" which can be converted into percentiles or other easily interpreted scales by the use of a table. There is now in widespread use a type of test which is scored by an electrical scoring machine. The machine operates by electrical contacts made through the pencil underlinings used by the student to indicate his answers. The quickness and accuracy possible in grading standardized tests certainly makes the life of the instructor easier.

Grading of tests is ordinarily called scoring. A central agency, like the Educational Records Bureau of New York, is often engaged to do the work. Such agencies have all of the necessary equipment, including scoring machines, and because of their wide experience they are able to furnish valuable interpretation and comments. Class instructors, however, are perfectly capable of scoring any well-designed test if they will follow the printed directions carefully. An instructor who has not had much experience with test scoring should ask a central agency or colleague, preferably one who has had experience, to make a sample check of his results. This is done by having the other person rescore a few of the tests, say one in every ten. If the check shows the same scores on these tests and if the average of the re-corrected tests approximates the average of those corrected by the instructor alone, the instructor can be reassured as



The room in which a test is given should be well-lighted, cool, and uncrowded.

to the correctness of his method and the accuracy of his work. The results of tests so often become a part of a student's permanent record that justice demands perfection in the work of scoring. An instructor who discovers he has made a

mistake on a result that has been filed should follow up the matter until it is corrected.

Giving of tests is almost always a duty of the instructor or, when the tests are given to large groups, of a team of instructors. A test which is given in any way contrary to the way it was given during the process of standardization is obviously not a sound basis for comparisons. For example, if the directions call for an allowance of five minutes for a question and ten minutes are allowed, many more students than expected can figure out the correct answer. Less time than that allowed makes many more fail. One way to guard against mistakes is for the instructor or a group of instructors to give the test to themselves. First study the manual of instructions. Read through the directions to students printed on the test blanks, and if separate answer sheets are to be used, on these too. Then have one instructor administer the test and the others take it. Try to simulate the conditions the students will work under as closely as possible.

The room in which a test is to be given should be well-lighted, cool, and large enough to avoid crowding. Individual desks and chairs placed in single rows with two-foot aisles between make the best arrangement. More often than not, however, tests must be given in mess halls or auditoriums. In the former try to seat the men with two feet between them (an allowance of three feet per man, or three on each side of a table 9' x 4'). In an auditorium use every other seat and, if there is plenty of room, every other row. Be sure that some sort of a firm base is provided for writing. Unfavorable conditions of lighting, ventilation, and seating and lack of a good support for writing may invalidate results just as much as cutting short the time allowance.

Conduct of the test itself is again a matter of following instructions carefully. Some of the main points made in the majority of instructions for administering tests are given below. The man who is to give the directions to the students should have a good voice and must be certain that everyone can hear him. He should explain the purpose of the test and the necessity for cooperation in obeying instructions. Students should understand that they cannot leave the room even to go to the toilet until the intermission, and should be told when the intermission is to come. The location of toilets should be explained.

Great care should be taken to see that no one starts the test ahead of time. The danger point comes when the test booklets are being passed out. The first men to receive them are likely to begin without waiting for formal directions. Repeat over and over as each batch of the booklets is handed out, "Do not look at the booklet or write in it until I give you the word."

When the answer sheets are to be machine scored, the giver of the test and the proctors must be certain that only the special pencils provided are used and that the sheets are not bent at the corners or folded in any way. Students easily understand the principle on which the machine works and that it can make no allowance for mechanical errors on their part. Therefore it is good practice to explain machine scoring to them before the test starts.

Be sure that your watch or stop watch, if one is required, is in working order. Write down the exact time of beginning and the exact times when students are told to start and to stop on each question. Writing down the times guards against wrong timing and serves as a record if there is any

question later. Be absolutely firm in keeping to the time allotments for individual questions and for the whole test. If anyone absolutely has to leave the room he must not be allowed to return.

Tests should be well proctored. Proctors must be sure that they understand and follow the directions as to giving out the booklets. Cheating on standardized tests is difficult and generally hurts the cheater, but should be guarded against by the proctor. The best way to check on cheating is to watch a man's eyes. It is easy to tell when they are searching a neighbor's paper.

Types, Use, and Choice of Standardized Tests

The principal types of standardized tests measure achievement, intelligence, and aptitude. The diagnostic test is a special variety of the achievement test. Achievement tests have questions based on what students are supposed to have learned from their books and instructors or from practical experience in a given field. Tests have been made up for most of the standard subjects of instruction, including shop. Intelligence tests are based on a general knowledge of a wide variety of subjects. But the "general knowledge" anyone acquires depends heavily upon his ability to understand what he reads and what he hears and, to a less extent, upon his ability to comprehend mathematics. Most intelligence tests for adults emphasize vocabulary tests and tests of a man's ability to comprehend what he reads and to solve problems involving mathematics. Aptitude tests are in general a mixture of achievement tests and intelligence tests. A person who has a particular aptitude for a subject has ordinarily had enough interest in it to pick up some information about it and this is reflected in his ability to answer questions and to work certain types of problems. Lack of aptitude for work which requires manual dexterity can be discovered by tests which require manipulation of phys-

ical objects. Lack of aptitude for professions and tasks which require high intelligence is shown by low scores on an intelligence test. Aptitude tests are really much better for telling what a man cannot do than for placing him in a specific job. Men with high intelligence will usually do well in any type of written aptitude tests and have a better than even chance of doing well in a test of dexterity. It would be foolish to make every man who does well in a manual test a carpenter or a surgeon when he might wish to be a teacher of science.

The uses of standardized tests are manifold. Achievement, intelligence, and aptitude are all of obvious importance in choosing men for admission to training courses. When the same or similar examinations have been given over and over and the students' scores on them compared with their success in the various courses, instructors and administrators can tell from candidates' scores how well they will do in their studies. Men who are doomed to fail can then be eliminated at once. Men of high potentialities can be grouped together, can be brought along rapidly, and can be trained for positions requiring advanced study. Men with somewhat less though still satisfactory ability can be taught more slowly and trained for duties which require less knowledge.

Intelligence tests have assumed a large place in gauging men's potentialities, but they are still not perfectly understood by many instructors. Intelligence tests were first given on a large scale to United States Army recruits in 1917. They still have certain limitations. No intelligence test has been devised which gives satisfactory clues to temperament. A hard-working plugger will often learn more from books

and apply what he learns better in practice than a volatile person with a much higher intelligence rating. Different tests, or even the same test given under different conditions, may produce very varied scores despite all claims to the contrary. Most intelligence tests depend on reading but the poor reader may be badly trained rather than unintelligent. To a less extent but still sufficiently to be a factor, scores are affected by the amount of schooling and other training a person has had and the reading and travel he has done. As a result it is unfair to base decisions on intelligence ratings alone, particularly when these involve comparisons of people whose scores are not widely separated. At the most the layman should differentiate groups on a scale not finer than a five-point—that is, superior, above average, average, poor, very poor. If a student's intelligence rating is reported as an intelligence quotient (I.Q.), all quotients of 120 and up can be called superior, 110-119 above average, 90-109 average, 80-89 poor, and below 80 very poor.

The advantages of having the results of intelligence tests for all students far outweigh the dangers. It is safe to assume that a man with a high intelligence rating is capable of doing good work in any course for which he has the other prerequisites. If he is not doing good work, the teacher should investigate immediately. Has there been anything wrong with the teaching? Is there a personality clash? Has the student been trying? Was he absent when a fundamental process was explained? Is he sick? Is he deliberately lying down on the job? Low intelligence coupled with poor work is another problem. An instructor who studies his students' records soon learns what intelligence ratings indicate lack of ability to pass his course and can take steps to eliminate

the man in question. He should not, however, act on the basis of the intelligence rating alone. These are too often mistaken and the dull but energetic man too often belies predictions based solely on his intelligence quotient.

During a course men who are not doing as well as expected on the basis of their intelligence and prior achievements can be given further and more detailed examinations. These will serve to check on the correctness of the earlier results. The additional tests which are given can be chosen to explore the man's fundamental knowledge and may disclose that he is poorly trained in some subject which is necessary for understanding the work he is doing. Testing of this type is called diagnostic testing and may make use of any achievement or intelligence tests or of tests designed especially for the purpose of diagnosis.

Diagnostic tests are like the laboratory tests a doctor uses to help him discover what is wrong with a patient. The best example is taken from the field of mathematics. Many students who have "passed" all of the prerequisite courses are found failing in higher mathematics courses and in courses like navigation where a firm knowledge of fundamentals is required. In order to find out where their failure lies the teacher gives them a test including simple problems in the fundamental processes. It is not unusual to find a man with credit for calculus who is unable to do logarithms correctly simply because he cannot add and subtract. Reading is another necessary tool where testing shows that proficiency is often wrongly assumed and diagnostic testing offers a basis for remedies. Excellent research studies of undergraduates in colleges like Dartmouth and Harvard have disclosed a surprisingly large number of men whose

reading speed and comprehension are far below the norms for high school seniors. A similar situation is known to exist in many of our officer-training schools. A test in reading should be given all students before admission or at least near the beginning of any training course which depends upon textbooks. Students whose scores are low should be retested and diagnosed by experts in handling reading difficulties.

In the choice of all types of standardized test the instructor is faced with the embarrassment of numbers. It cannot be said that there is an embarrassment of riches because too many ill-conceived, poorly worded, and badly standardized tests are on the market. Under these circumstances the instructor is fortunate if he is able to secure professional advice either from a trained psychologist on the training-school staff or from one of the recognized central agencies. In no case should a test be accepted on the unverified claims of the publisher. One way of securing an unbiased opinion is to look up any test under consideration in "The Mental Measurements Yearbook," edited by O. K. Buros. The volumes can be borrowed from most libraries or purchased through a bookseller. They contain frank reviews and fair estimates of the value of tests in print.

The purpose to be served by a test is naturally the controlling factor in choosing one. First are the broad divisions of achievement, intelligence, aptitude, and diagnosis. Parallel with these are the possibilities of using tests to control admissions, to help place men in classes organized according to ability, achievement, and experience, to discover what progress men are making in a given course, and for use as final examinations. Only a thorough study by the instructor

will let him know how well a specific test fits any one of these objectives. Some will be too easy, others too hard, others too abstract, others with too much emphasis on some phases of a subject and not enough on some. Even after careful study a trial may bring disappointments, especially in proving a test too hard.

Other factors in the choice of a test include the time it takes to give, the time it takes to score, and the ease of administering. The giving time must fall within the limits of the class or examination period. In general, a test which requires the students to give many answers in a short time has more value as an achievement test than one which takes longer to cover less ground. Rapid scoring saves valuable time for the instructor and the very fact that it is possible indicates a simple and relatively foolproof system. Ease of administration depends upon the brevity of the instructions which must be read to the class and upon a simple timing arrangement. There are still some tests on the market which must be timed by a stop watch. This is difficult for the classroom instructor to manage and when he has a choice he should avoid selecting such tests.

A good printed manual of instructions to accompany the test is another desirable feature, especially for the inexperienced tester. The manual should contain directions for administering the test, tables for converting scores into percentiles or other norms, tables showing the range and averages or percentile rankings in typical classifications, and directions for interpreting the meaning of the scores made by one's own students. Most manuals will also contain an account of how the test was standardized, which will repay study by the instructor.

Marks and Records

A marking system of one kind or another is ordinarily a part of every phase of education from the elementary school through the most advanced studies. Marks can be an aid to the student in his efforts to learn, a help to instructors in guiding students' efforts, and a handy record for future use by personnel officers. They may also be an unfair handicap to students while they are learning and may interfere later with the placement of the right man in the right place. By and large, men who get good marks in college are more likely to do well in life than those who do not. But the world is full of brilliant failures and unforeseen successes whose careers prove their teachers poor prophets. A set of marks alone is meager evidence of a man's abilities or disabilities. Records which include much information in addition to marks are easy to devise and easy to keep. A full record does much to eliminate the dangers and enhance the values inherent in any marking system yet invented.

The determination of marks should rest upon as much information as possible. Luck may play a big part in the combination of a few recitations, a few short written papers, and a final examination, particularly in large classes where the instructor does not know his students well. There is a good foundation for stories like the one of the college-entrance

candidate who had a friend explain to him a proposition in geometry just before going into the examination and found that the identical proposition was the first question. Clever spotters of questions often get high marks without acquiring much knowledge. Intelligent but slow workers often suffer from doing each question too well and so failing to finish the examination. Experiments which require instructors to grade and regrade the same examination papers have shown that an instructor may grade the same paper as much as twenty per cent lower or higher after a brief interval. Two instructors grading the same paper are likely to differ even more in the mark they give. On the other hand, an instructor who has met a class for thirty or more hours, who has made it his business to know the men in it personally, who has been careful to give each man a part in each day's work and kept some record of this, can make a fairly sound judgment of each man's achievement and ability. Such an instructor will find few surprises in the results of final examinations or in his students' subsequent careers.

Hard and fast rules for arriving at marks are to be looked upon with suspicion. Teachers sometimes forget that a few points one way or another in a mark are very much a matter of opinion. Once a mark has been entered in a marking book, it tends to become sacred. Many teachers mistakenly adhere closely to a formula by which the final mark depends $\frac{1}{3}$ on daily work, $\frac{1}{3}$ on written reports, and $\frac{1}{3}$ on the final examination. The formula may be applied to some fifty marks and produce a result like 69.49, when 70 is passing. These teachers often call the 69.49 a failure and do not even venture an opinion as to whether the student's work has

really been satisfactory. They do not seem to realize that all of the marks which control the final mark have been based on opinion and that a single paper marked a point higher would bring the final mark to passing. It would help these teachers to think out the atrocious puns in the following sentence: "In passing it is fair to remark that 'satisfactory' is a better guide to a 'mark' than 'passing.'"

There are three marking scales in general use. The numerical scale of 100 is perhaps the most familiar. Under it a student can be graded any place from 0 to a perfect 100. "Honors" are usually set at 90 and above. "Passing" may be any place from 50 to 75, with a tendency to center at 70. The "four-hundred system," which is actually a numerical scale of 4.00, was first devised for West Point by Yale's great scientist Josiah Willard Gibbs, and is still used at the service academies. It has the advantage of wide range. It was also used at Yale until the first world war, when strangely enough, the R.O.T.C. insisted on a change to the scale of 100. On the scale of 4.00, 3.30 is usually called high honors, 3.00-3.29 honors, 2.60-2.99 satisfactory, 2.00-2.59 unsatisfactory, below 2.00 failure.* The system of letter grades of A, B, C, D, and E, with A honors, B good, C fair, D unsatisfactory but passing, and E failure, has two great advantages. It parallels our human tendency to use a five-point scale of excellent, good, fair, poor, very poor, and it recognizes the impossibility of making the fine distinctions implied by marks separated by less than ten points on a numerical scale. Psychologists in general recommend the use of a five-point rating scale but there is something to be said for a

* There is, however, a tendency to parallel the 100 scale and call 3.60 high honors, and so forth.

system using the three-point scale of superior, satisfactory, and failure, or A, C, F.

Position in the class is a system of grading used by some institutions. If large numbers are involved and if something is known of the institution's standards, this is a good indication of ability. It does not indicate achievement accurately, because whole groups are notoriously different in caliber. A class where everyone has done excellent work is often immediately followed by a poor or mediocre class in the same institution. This fact makes ridiculous the occasional official requirement that marks be distributed through a group according to a fixed percentage, for example, 20 per cent of the group receiving A, 20 per cent B, 30 per cent C, 20 per cent D, and 10 per cent E.

The table of comparative marks printed here is convenient for use when records contain more than one type.

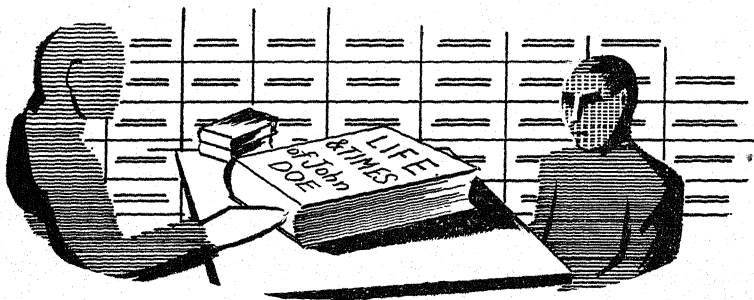
Table of Comparative Marks

A	90-100	3.30-4.00
B	80- 89	3.00-3.29
C	70- 79	2.60-2.99
D	60- 69	2.00-2.59
E	below 60	0 -1.99

Some teachers try, in arriving at a final mark, to consider the student's effort and his improvement since the beginning of the course. Recognition of the worth of both these factors is valuable but to make them part of a single mark is quite likely to be misleading. A brilliant student who learns easily or one who has had prior training may loaf through a course and actually, because he thinks he knows it all, be not as

good at the end as at the beginning. But he may still know far more about the subject than anyone else in the class. To give him a low mark, or to give the hard worker a high mark, may gravely mislead officials responsible for vocational placement of individuals. It is far better to rate effort and improvement and any other traits, e.g., neatness, separately. It is best of all to leave room on the record card next the space for the grade and enter there any pertinent comments the instructor wishes to make. Or if the record card is just a summary of information on file, a check mark can be used to indicate that the file contains comments by the instructor.

The best safeguard of any marking system is a thorough understanding on the student's part of its purpose and



Student records can be too full.

methods. It is good practice to make a mark the subject of a conference between student and teacher before it is formally entered on the record. Some institutions make such conferences a policy and actually leave a space on the record for the student's signature and for any observations he may wish to make. The conference about a mark ought to stress

the future use the student will need to make of the information from the course. This helps him to remember what he has learned and promotes in him a desire to make good his deficiencies. Sincere praise should, of course, be used wherever it can be.

Student records must steer a narrow course between being too full and cumbersome and too meager. Mistakes in either direction will interfere with the record's wide and efficient use. And the first principle of record making is that use is the only criterion. There is a great deal of information about individuals which is of interest that belongs more in a biography or a novel than in an educational record.

Records become more valuable and therefore are more used if they are cumulative. Low marks for one year, for example, might be due to absence caused by prolonged sickness, but low marks for several years of school and college are a pretty sure indication of lack of academic ability.

Some system of summarizing information is a practical necessity if a cumulative record is not to become too cumbersome. It is now a frequent practice to provide a strong manila envelope or folder to contain the documents necessary to a good record and to have a summary form printed on the outside of this envelope or folder. Then, instead of taking the time to copy onto the record card, for example, the secondary school record, the record itself is placed in the folder and check marks are placed in spaces provided on the face of the folder to show that the high school record is inside. A general indication of the quality of this record, perhaps a rating on a three-point scale, is also a time-saver.

Items to be placed on the record summary and documents required for the folder will differ from institution to institu-

tion. For the summary, administrators should consider including spaces for the following: the student's picture, finger prints, name, place of birth, date of birth, present address, past address, future addresses; the parents' names, birth-places, birth dates, native languages, addresses, occupations, and religions; indications of what earlier educational records are on file and their general quality; an indication of whether health records and records of physical examinations are on file and of whether or not they show anything unusual in the way of sickness, accidents, or general conditions; names and results of intelligence tests and of standardized reading, mathematics, and mechanical-aptitude tests; a notation as to extracurricular activities, hobbies, and other special interests, curricular or extracurricular; courses taken; final marks; degrees or certificates awarded; and recommendations made. A 6" x 8" record card printed on both sides will contain all of this information, or a form for it can be printed on one side of an 8½" x 12" folder.

Files may well contain, in addition to the information indicated above, written comments and recommendations as to future assignments by several or all of a man's instructors, samples of written work, and anecdotes written up by witnesses to show achievement (or lack of it) and temperamental traits.

Early and periodic checks of all information submitted for students' records should be made by a guidance counselor or other competent official. This will make it possible to give special consideration to students who seem to be headed for difficulty, and to save some and to eliminate waste effort in many cases. It will also give clues as to which students should be encouraged to consider the choice of certain courses or

fields for specialization. When a considerable amount of information has been accumulated it should be made the basis for a conference with the student on his future. It is a good plan to assign an instructor as a special adviser to each student. This adviser will find a full cumulative record invaluable in all of his contacts with the student. He should not wait for the student to come to him for advice or because he is in trouble. Rather he should make it a practice to consult with each of the men under his special care regularly. The cumulative record will give him and the student common ground for discussion. It will allow the instructor to give wise counsel on obvious dangers and on potential opportunities. Obviously records used for these purposes must be kept up to date.

Discrepancies in the record indicate the need of immediate special attention. A man with a good past record or with a good intelligence who is reported to be doing bad work may be sick or he may be disturbed by some personal problem which the adviser can help to clear up. A high mathematics-test score coupled with a low score in reading may indicate that the student needs the services of a reading specialist. A low mathematics score may disclose poor training in the fundamentals and the advisability of concentrated review. A rapid decline in general average may indicate sickness. A slow decline may be due to lack of study, or even to lack of knowledge of how to study. In any case, the record is there for the interested adviser to examine with a view to how best to fulfill his obligations to his men.

Special Practices in Industrial Training

Industrial training programs present special problems in the choice of instructors, in the adaptation of materials to the needs and abilities of the students, in the coordination of training with practical work, and in the conduct of classes.

Instructors in any field are good teachers only in so far as they have a sound and growing knowledge of their subject. But knowledge alone is not enough. Many a good workman has been a failure when trying to teach even one apprentice, and many more, confronted with a class of ten, simply cannot find the words to explain how a given operation should be done. Men who have practical skill, the ability to express themselves, and the qualities of leadership which make a good teacher may feel that if they accept work in the training department they are stranding themselves outside of the stream of promotion. To take men who have been trained as teachers and teach them what they are to teach is one solution. But the salary scale necessary to attract first-rate teachers-college graduates is high, and the gaps which will inevitably persist in their practical knowledge make it wiser to reverse the process. Employers are finding that it pays to establish in their training departments salary scales, systems

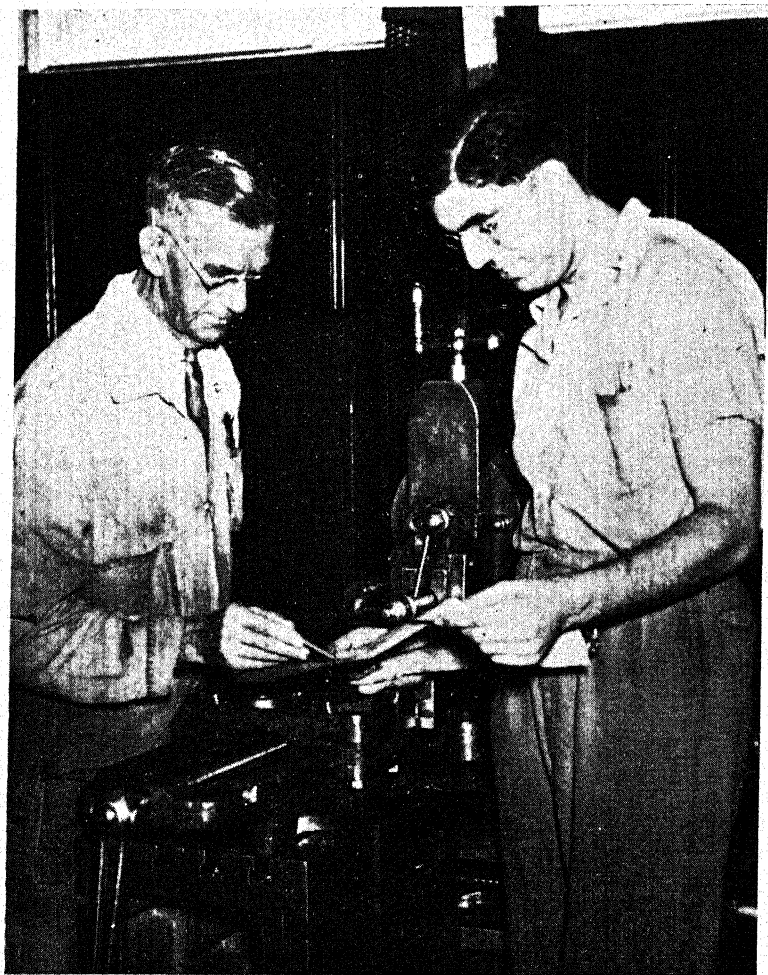
of promotion, and working conditions which will attract the best men in their employ.

Turning a good man loose in a classroom does not make him a teacher. The proverbial bull in a china shop is not suddenly changed into a salesman. The practical man who is to teach must be given help in learning his new work. From the beginning the new instructor should have the help and support of the head of the training department, who should make frequent short visits to the classroom and follow these by conferences in which questions are encouraged and suggestions freely offered. Warm praise given at every legitimate opportunity and a general attitude of cheerful friendliness are the greatest helps.

Inexperienced instructors and instructors new to a situation should be introduced to helpful books and periodicals both in the field of teaching and in their specialties. Anyone who is taking up a new line of work is likely to be slightly bewildered and to find it hard to discover the most helpful printed materials. Sometimes the new teacher even stumbles on books which give poor or actually harmful advice and takes what they say as gospel. Early guidance is a guard against these troubles and a time-saver for everyone concerned.

Courses in teaching methods open to industrial instructors are often given in teacher-training institutions or in universities within commuting radius of the plant. Sometimes there are also extension courses given in even more convenient locations. The institutions in the neighborhood, the local superintendent of schools, and the officials of state departments of education are all glad to give information about such courses.

Educational consultants can give much stimulating advice



Industrial training. (Courtesy *Meriden Trade School*)

to instructors and to the management on the organization and conduct of industrial training programs. State departments of education sometimes maintain divisions for this very purpose. The local school superintendent or his assistant in charge of adult education is usually glad to help, especially if he is offered a fee. Instructors in university schools of education make a regular business of surveying training programs and when the occasion calls for it are in a position to carry through a thorough study of a situation and to make detailed recommendations. When any expert is called in, it is wise to have in advance an understanding of the extent of the services he is to render and of the fee he is to charge.

Instructors in industrial training programs must, if they are to do a good job, be allowed plenty of time to concentrate on their teaching. It is not fair to the man or to the trainees to snatch a foreman from his work for an hour or two of classwork. He is likely to resent it or at least not to put his mind on it. He will be unable to prepare his teaching adequately or to give individuals the attention they need. Teaching as much as two hours a day is a full-time job, particularly if the teacher is to keep himself in the forefront of his trade by taking courses, making visits to other plants and training programs, and continuing with his technical study. If a foreman must carry shop supervision in addition to teaching, it is probably wise for him to take the new employees right into his section of the factory and put them to work under his eye. What is lost in the study of theory will be made up in practical experience.

Printed materials suitable for programs designed to train employees in the particular processes used in a specific factory may be difficult to find. This difficulty is increased when

the employees in training are likely to have had little education or even when they have been long out of school. It is a mistake, however, to assume that suitable published texts are not available and to issue mimeographed materials without a thorough search in the book market. Mimeographed materials have many disadvantages. They are often hard to read. They quickly turn flimsy. Pages are easily torn out and lost. In mimeographed booklets of any size pages are often omitted in the make-up. Drawings are hard to reproduce clearly by mimeograph, and photographs impossible. Moreover, mimeographed or homemade instructional materials of any kind often lack the skill in presentation and arrangement which professional authors and publishers devote to books. If special materials must be developed it pays to have them edited by a professional editorial worker and then planographed instead of mimeographed. The planograph process reproduces typewritten copy and line drawings with clarity.

The training-program director and his instructors can start the search for appropriate books in print by going to the nearest public library and consulting the United States catalogue of books in print. The librarian will be glad to help. Large general booksellers will also be glad to suggest titles and usually to send copies of the books on approval. A study of the book-review section of newspapers such as the "New York Times" often supplies the names of several publishers who are specialists in any given line. They will be glad to send their catalogues, to send sample books, and to have their salesmen call. It is easy and pleasant to spend too much time listening to the stories which some book salesmen tell, but it is just as bad not to talk with them and the salesmen from the school-supply houses and find out what they have to offer.

These men and their companies exist only so long as they continue to meet the needs of education. They are largely responsible for many of the recent developments and improvements in educational books and supplies.

Sometimes it is possible to locate a book which almost serves the purpose. It may be slightly too advanced for the needs of the program, or too short, or too long, or somewhat out of date, or lacking in illustrations. In these circumstances the publisher and author may very well be glad to get out a revised edition. They are probably aware of the need of making changes and only waiting for assurance that there will be an adequate sale of the new edition.

Visual education is even more important in industrial training programs than in other fields of education. As far as motion pictures are concerned, the homemade movie is likely to be even less useful than a homemade text. For some reason plant managers often think that movies they have themselves taken in the plant will be useful in a training class, when it would take less time and effort for the class to walk out into the factory and actually see the wheels go 'round. The essential virtue of the educational motion picture lies in the chance it offers to simplify and to analyze, and the filming processes these entail are beyond the amateur. For example, an animated cartoon can first show the shape of parts in bold outline, then ink them in and move them into their proper place. If humor can be added, so much the better. When we think of animated cartoons we think of Walt Disney, and it is not surprising to discover that he has designed and produced some of the very best teaching films. The manufacturer who has a training division and cannot find satisfactory teaching films already on the market should at least consult one of the

big companies or one of the firms which specialize in custom-made movies before he attempts to take his own.

Models, charts, cut-away machines, individual parts, still photographs, slides, and film strips are often available from the manufacturers who sell factory equipment. If not, most of these can be made to advantage in the factory shop or by the instructors and students in the training program. Often a machine that is about to be scrapped can be turned over to the training department and cut away to show the inner workings of the machine and so to demonstrate a principle. But when it comes to machines for practice in operation or in taking down and in assembling, it saves time and money to provide exactly the type of machine which the trainee is going to operate.

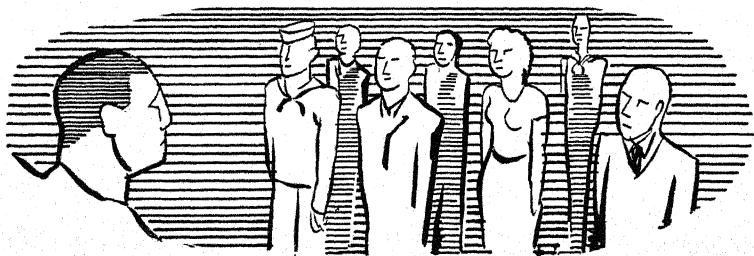
Coordinating study and practice ought to be easy in an industrial training program, but it is not unusual to find them separated by watertight bulkheads. It must be confessed that, when a factory is going full speed and every tool is needed to feed its bit into the production line, foremen who object to having schedules disrupted by part-time use of machines for training purposes have reason on their side. In some places the numbers in training are so large that it is possible to keep relays of trainees operating one or two machines. In these cases an instructor is often assigned to supervise and inspect the work under the direction of the shop foreman. Another arrangement is to have samples of most of the machines used in a factory installed near the training center so that the trainees can operate them to produce finished products. The closer the setup can be to that actually employed in the factory the better. In any case it is foolish to confine trainees to long sessions of theory. Daily intervals of practice, in fact,

more practice than theory, are essential for motivation and for drill. Therefore a careful analysis must be made of the various processes to be taught, and then the teaching must follow an order which allows the trainee to put what he is learning to immediate use. When this can be done it provides an ideal learning situation.

Classroom discipline is a problem in industrial training programs which are not thoroughly motivated. Sometimes trainees, both men and women, revert to childhood practices and do everything from whisper to throwing spit balls. More typical faults are sullenness, drowsiness, inattention, and general lack of effort and cooperation. It is easy to find causes for these, but harder to find cures. New employees often take the attitude that they came to work not to study. A lower rate of pay during the training period is reasonable but irksome. Old dislikes of school are revived by the schoolroom atmosphere. Weariness from other work and long hours of unaccustomed inactivity add to the trouble. Lack of teaching skill on the part of the instructor, including difficulty in presenting his special knowledge at the level of the learner, is another factor. When the teaching is just an added chore which the teacher himself resents, friction between him and the class is multiplied.

The first step in promoting good discipline is taken by inducing close cooperation between the employment manager, the personnel manager, and the training supervisor. The employment manager can help by making it clear to all applicants that a given period of training is necessary and that for this time the new employees will be going back to school. The personnel manager can help by giving standardized tests to all new employees and placing the trainees in courses

in line with their abilities. When a company does not have the facilities to give tests itself, it should secure the assistance of an industrial psychologist or of a group like the American Psychological Corporation of New York. The training instructor should, of course, be given all of the information the employment and personnel managers have about each man who is in his courses. Finally the personnel manager can place the men who do well in a training course in preferred positions and see to it that new trainees realize that their placement and earning power may depend on the recommendation of the training instructor. Dollars and cents remain the most powerful motivation in the world.



Are you interested in your students as individuals?

The constructive components in good classroom discipline are: (1) a desire and effort to learn on the part of the students; (2) materials which the students can understand and master; (3) satisfaction with progress; (4) a friendly personal interest in the students on the part of the instructor; and (5) good conditions of lighting, seating, and ventilation. Destructive forces are: (1) failure to make plain to students their need to learn; (2) theories, terminology, drawings, and

explanations too difficult in themselves for the students to grasp or presented too quickly for them to understand and remember; (3) mental fatigue resulting from prolonged sessions in the classroom; (4) physical fatigue due to poor ventilation, lighting, or seating; and (5) above all, failure to keep every student busy and interested.

If you are an industrial instructor and are having trouble keeping the attention of your students, ask yourself the following questions. Are you interested in your trainees as individuals, eager to see them do their best and achieve a secure position in the regular force of the factory? Do you know them by name and know something of their previous experience and their ambitions? Are you trying to give each one the knowledge he needs in a way suited to his abilities? Are you praising individuals and groups who merit it? Are you preparing for your teaching carefully every day and doing all you can to keep the students' interest alive? Are you aware of what is going on in your room and quick to make adjustments to new situations? All of these points have been discussed in earlier chapters in this book. One test of your ability to become a good instructor is your willingness to study books like this and to try to improve your teaching techniques.

A Note on Teaching Foreign Languages*

The ability to read, speak, and understand one or more foreign languages has suddenly become very desirable to hundreds of thousands of members of our armed forces. Post-war international relations, whatever their pattern, will probably sustain the usefulness of a knowledge of languages and create a demand for men who have learned them. The army and navy have recognized these facts in their organization of Divisions of Languages in their college training programs.

The wise choice of men to specialize in foreign-language study presents several difficulties. Not much faith can be put in any of the language-aptitude or prognosis tests so far developed. A high intelligence is a help in language learning as in other kinds of study but it is not a guarantee of success.

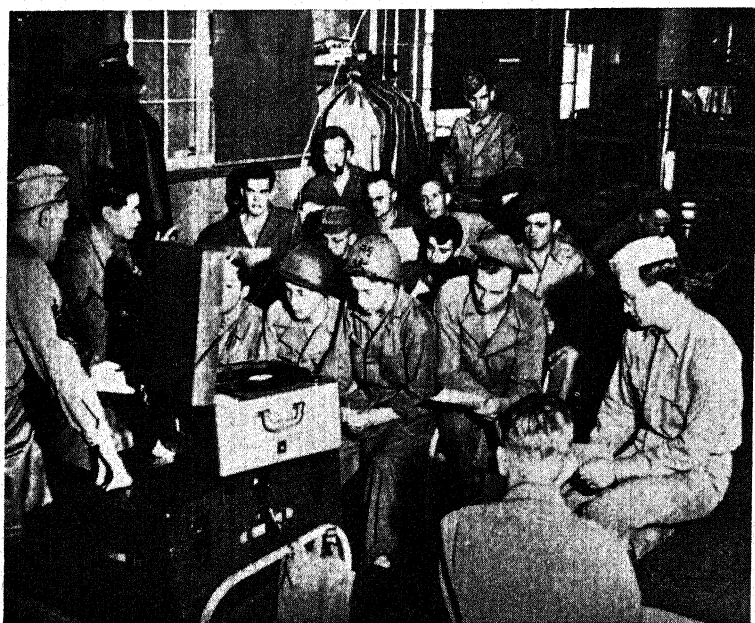
* This chapter is largely taken from the author's report "Conference on the Teaching of Foreign Languages," issued for limited distribution in mimeographed form by the General Education Board of the Rockefeller Foundation in March, 1939. The conference was under the auspices of the Board. The group consisted of eighteen teachers and scholars, including teachers of French, German, Spanish, Russian, Chinese, Latin, Greek, English, and "Basic English," and scientists from the fields of linguistics, lexicography, anthropology, physics, and psychology. A modified form of the report was published by the author in the "French Review," Vol. XIII, No. 4, February, 1940.

Also there are many cases of men of low intelligence who, faced with necessity, have learned to speak a second language at least as well as they do their own. Acuity of hearing and a good ear for music are probably assets in language learning but again no guarantee of success. When all is said and done the best measure is an actual trial in a foreign-language course. If a candidate has studied any foreign language previously, every effort should be made to discover how well he did in it, how much he remembers of what he learned, and the extent to which he has kept up the language since he finished the course. An achievement test in the language he studied provides the most concrete information. A man who has done well in the study of a foreign language and shown enough sustained interest to continue reading or speaking it is a good risk in any language course, even one that takes up a very different language. It is undoubtedly true that with each new language a man masters, his ability to learn another language increases. This holds for students who have done well in Latin and Greek and then start a modern language. Candidates who have not done well in a previous attempt at language learning will be poorer risks, but they cannot be ruled out. Unfortunately, much of the teaching of ancient and modern foreign languages in the United States has been such that many potential linguists have not only failed to learn much but have even had their natural interest killed. Men who have a failure on their record and still want a chance to learn may well be given that chance provided their general ability seems up to the duties in which the use of the foreign language will be required.

The length of a course, the arrangement of hours, and the size of classes are all matters which are likely to be controlled

by circumstances or by administrative fiat. The wise administrator, however, will consult the men who are to do the teaching. In any case, the instructor has a wide leeway in the choice of methods and some in the choice of materials. He must try to adapt both to the needs of the group he is teaching.

The ordinary arrangement in school and college language courses, where a large class meets for forty or fifty minutes three or four or five times a week, is horribly inefficient. The



Phonograph records and "native" assistants help the Army learn foreign languages. (Photograph by *Press Association, Inc.*)

amount of class time available varies from seventy-five to a hundred and twenty-five hours a year, or the *time* equivalent of a week or two in a foreign country. Even if every student pays strict attention every minute, the time allowed is evidently too little to make much progress. When thirty or more students must divide the time in separate recitations, the allowance becomes absurdly small. Moreover, the fact that the language course is but one of many makes motivation difficult and deprives the student of the opportunity he needs to soak himself in the subject. And the time between all classes and the long intervals during vacations encourage forgetfulness. Only by concentrated outside study can a student make much progress in such a course, and the start of a foreign language is the very period when independent study is least efficacious.

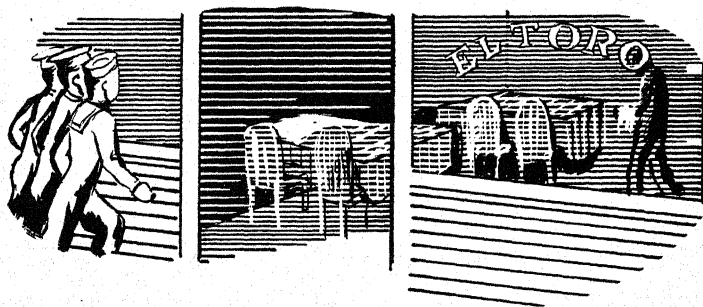
Intensive courses for mature students have proved successful substitutes for the long-drawn-out traditional courses. The intensive method is well exemplified by the courses for graduate students taught by Professor Samuel Cross at Harvard. These take their inspiration from the speed with which foreigners set down in a new environment learn the language which they hear all day and must use to satisfy their wants. For such men, motivation is obvious and there is none of the "lag," the need to start over again, which our course system involves. The intensive course is organized on a six-week basis with two meetings of one and a half hours each day, five days a week. The classes are limited to fifteen students. The instructor knows each well enough to push him to the limit of his ability. The work starts with elementary grammar and reading. The reading is stepped up in difficulty as soon as the students begin to find it easy. Phonograph records and

a "native" assistant are used to help in pronunciation. Vocabulary stresses the needs of travel and other practical purposes. Required homework fills many out-of-class hours. The reading vocabulary of the students is reported to be well advanced in three weeks. By the end of the six weeks most of the men are prepared to continue by themselves to a reading knowledge of the language or to make rapid progress to oral fluency if they are placed where this is necessary.

A course of a new type which meets the standard schedule of three fifty-minute periods each week for thirty weeks was developed by the late Frederick Luquiens, professor of Spanish at Yale, and has been carried on by his colleagues. This is based on the minimum amount of grammar and the minimum vocabulary considered essential for understanding and reading South American Spanish. Absolute knowledge of these minimum essentials is required, and as the student is learning he is given weekly tests which are designed to provide a check on all that he has learned to date. Current South American newspapers are used as reading texts together with a brief history of South America. Work in the class is almost all in Spanish, although the instructor does not hesitate to give an explanation in English when this seems necessary for clarity or to save time. Class size averages twenty students. Many students fail the course, but those who survive tend to continue the study of Spanish. Students who have had only two years of the work have been able to tour South America and to hold public debates in Spanish with South American university students.

The "intensive" system and the "minimum essentials" system can and should be combined when there is need for learning a foreign language quickly. The principal problem

in organizing either type of course lies in the choice of vocabulary. It took Luquiens many years of patient work to establish his list. Lists which show the frequency with which words are used are available for many languages and are helpful. Such lists, however, are based largely on literature and not on the requirements of everyday or technical use. Moreover there is a difference between the words most used by a native and the words most useful to a beginner. "Basic English," developed by Ogden and Richards to teach English to foreigners, depends on a vocabulary of 850 of the "most useful" English words. Little work along these lines is available for foreign languages, but the foreign-language teacher



Expectation of practical use is the best of all motivations.

will find the Basic English list interesting. Under the circumstances the instructor must familiarize himself with the word lists published for the language he is teaching and at the same time seek help from technical experts and exercise his own judgment in determining the vocabulary the students should learn.

Motivation must be thorough and interest well-sustained for success in language learning. Expectation of practical use is the best of all motivations. This accounts for the wide knowledge of foreign languages among Europeans. In the smaller countries especially, fluency in two or three languages is an important vocational asset in all walks of life. In contrast, most Americans have not looked forward to entering any occupation where anything but English will be required. Even in the export trade and the diplomatic corps it has been thought that technical knowledge and social graces are preferred to linguistic skill. A war which has scattered millions of Americans over the globe has changed this point of view, perhaps permanently.

Interest in a foreign culture with which the student may soon have close contact is a potent means of motivation. It should be cultivated early and continuously in all language courses. A sense of satisfaction or feeling of achievement is of constant importance, and as a means to this end materials which are always challenging but not too difficult are essential. An early synthesis of the student's present knowledge (e.g., loan words, technical terms, and cognates) gives a good start. Granted satisfactory materials, the student should be kept aware of his progress by being given frequent tests and studying his record on them.

"Language pride," the feeling of satisfaction which comes from an ability to understand what is written and spoken in a foreign language and to communicate in it, is of the greatest value in sustaining a student's interest and effort. Natural contacts with the language at an adult level give the best opportunity for the development of pride. Films and plays using the foreign language, lectures by visiting officers of

foreign armies, visits to foreign boats or service clubs, foreign broadcasts, and acquaintance with bilingual adults are possibilities. Actual foreign travel and the experience of establishing contact, however fumbling, with the native residents of a country is the best of all. The advertisements of correspondence courses which show the young man astounding his friends by speaking to the prince in fluent French are based on sound psychology.

Classroom methods are to a large extent controlled by objectives. The ability to read the foreign language has in the past been the natural objective of most language courses in America. This is not as true of war training courses, but even in learning to read, oral-aural use is a necessary foundation. Almost everyone vocalizes at least unconsciously even when he is reading his native language. It follows that a consistent system of pronunciation saves hesitation even in silent reading. This might as well be the correct pronunciation, especially as faulty pronunciation is difficult to unlearn. At the beginning of every course, much emphasis should be placed on correct pronunciation of both words and sentences. Professor Walter Kaulfers, of Stanford University, a very successful teacher of beginning Spanish, always pronounces each new word three times himself, has the class pronounce it in chorus and a few individuals separately, and then takes care to use the word several times in the course of the period. The student should from the very first day hear much of the foreign language correctly spoken and be able to understand different people. This does not require a strictly "direct-oral" method. Small classes (not over fifteen) are a great asset in teaching pronunciation because of the opportunity they afford for practice and correction. Correction, even emphatic

correction, is gratefully accepted by students who understand its purpose, especially if the manner of the teacher is pleasant. Foreign-language phonograph records and foreign sound films and radio broadcasts are all helpful in teaching pronunciation and in accustoming the class to accents and intonations different from the instructor's. A "native" instructor should conduct at least part of each course.

Grammar and syntax are helpful in learning a language only to the extent to which they are understood by the students and of daily use to them in their reading and speaking. The phenomenon of students being required to learn rules which are not exemplified in their current study materials is far too frequent. Only for the mature student who already has a knowledge of the grammar of other languages is a wide study of grammar in an elementary course valuable. In general the beginner should concentrate on the forms and rules he meets in his everyday reading and conversation. Forms and principles which are included occasionally in elementary work and are frequent in advanced work can be pointed out in passing, but students should not be required to memorize them. When true "minimum essentials" of grammar have been established, they should be learned absolutely.

Reading materials are a constant problem in every elementary language course. For the best results they must be in themselves interesting to the students. Interest thrives on connected reading matter dealing with subjects which concern the students. Adult fiction, current news, the history and customs of the foreign country, and technical discussions are examples. Technical discussions are especially valuable when a class happens to be preparing for work in a given field. The men will already be familiar with much of the vocabulary

and the style is likely to be simple and straightforward. These characteristics make for the ease of understanding which promotes early learning. Simplicity of vocabulary and syntax are also found in many newspapers and some fiction. They are unfortunately rare in books on history and civilization. Lacking suitable materials the instructor may find it necessary to write them himself. This is not an impossible chore. Adaptations of foreign books or newspapers help the process, but care must be taken to limit the vocabulary and syntax as closely as possible to the minimum essentials and at the same time to endeavor to retain a characteristic style or flavor.

Translation is generally too much emphasized in language teaching. It has a place in locating difficulties and in checking progress but its regular use is to be avoided. Too much translation cultivates the habit of word-by-word comprehension and so slows reading and makes understanding of rapid conversation impossible. A good substitute is a discussion in English or the foreign language of the ideas of a sentence, page, or chapter.

Constant testing of each student's progress should be a regular part of every language course. In classes small enough for every student to take active part every day, this can to a certain extent be done informally. Objective-type tests of vocabulary, grammar, and even pronunciation are not difficult to construct and they give a far more factual record, a far better day-by-day or week-by-week comparison, of a student's progress than oral recitations. In classes of twenty or more, written tests should be given at least once each week. These tests should cover as much as possible of the work to date in both vocabulary and grammar and not be based merely on the week's work.

Individual differences in intelligence, family background, prior training, acuity of hearing, auditory memory, and general aptitude quickly produce a wide spread in the progress of the different members of any language class, however small. Different methods are called for with different students. Small classes make it easier to accommodate individuals, but teachers can make mistakes with small numbers as well as large. It is not unusual for a visitor to a class to find a teacher listening to one student stumble through a translation for five or ten or more minutes. The other students listen only enough to keep the place, if at all. Methods of providing for individual differences were presented in Chapter 15. Group conversations within class time and individual assignments of outside reading are particularly helpful in language work. Language teachers also have a unique opportunity of providing for individual differences by having students use different language records both in and out of class. Where recording machines are available it is even possible to make records to help an individual correct his mistakes or practice new materials.

The personality of the teacher is the controlling factor in successful methods, whatever the field. If a teacher is hesitating, weak, and uninterested he will do little to help those who study under him. Force and enthusiasm based on belief in a subject, self-confidence based on knowledge, and interest based on human understanding make a teacher of any man.

Select Bibliography

Nelson L. Bossing, *Progressive Methods of Teaching in Secondary Schools*. Boston, Houghton Mifflin Company, 1942.

Norma E. Cutts and Nicholas Moseley, *Practical School Discipline and Mental Hygiene*. Boston, Houghton Mifflin Company, 1941.

Educational Film Catalog, Standard Catalog Series. New York, H. W. Wilson & Co. Current and cumulative lists are issued from time to time.

Educational Screen, published by Educational Screen, 64 Lake Street, Chicago. This magazine is devoted to motion pictures in education. There are ten issues yearly.

Encyclopedia of Education, edited by Walter S. Monroe. New York, The Macmillan Company, 1941.

Harry A. Greene, Albert N. Jorgensen, J. Raymond Gerberich, *Measurement and Evaluation in the Secondary School*. New York, Longmans, Green and Co., 1943.

Peter Hagboldt, *Language Learning*. Chicago, The University of Chicago Press, 1935.

Charles F. Hoban, Jr., *Selected Educational Motion Pictures*. Washington, The American Council on Education, 1942.

Harry C. McKown and Alvin B. Roberts, *Audio-Visual Aids to Instruction*. New York, McGraw-Hill Book Company, Inc., 1940.

The Mental Measurements Yearbook, edited by O. K. Buros. The 1938 volume and those for preceding years were published by Rutgers University Press, New Brunswick, N. J. The 1940 volume is published by the Mental Measurements Yearbook, Highland Park, N. J.

Military Training, Basic Field Manual FM21-5, War Department. Washington, United States Government Printing Office, 1941.

Elting E. Morison, *Admiral Sims and the Modern American Navy*. Boston, Houghton Mifflin Company, 1942.

Motion Picture Projectors for Classroom Use. New York, Committee on Scientific Aids to Learning (41 East 42nd St.), 1941.

C. K. Ogden, *The System of Basic English*. New York, Harcourt, Brace and Company, 1934.

Psychological Bulletin. This monthly magazine has in each issue an excellent section on psychology in the war.

The Psychology of Learning, 41st Yearbook, National Society for Study of Education, Part II. Chicago, The University of Chicago Press, 1942.

Review of Educational Research. Each issue is devoted to one or more specialized fields. The issues on teaching methods and on learning are of especial interest to instructors.

Raleigh Schorling, *Student Teaching*. New York, McGraw-Hill Book Company, Inc., 1940.

Slide-Films on Teaching Methods. Detroit, The Jam Handy Corporation, 1942.

Sound Recording Equipment for Schools. New York, Committee on Scientific Aids to Learning (41 East 42nd St.). 1940.

Sound Recording Technique. New York, Committee on Scientific Aids to Learning (41 East 42nd St.), 1940.

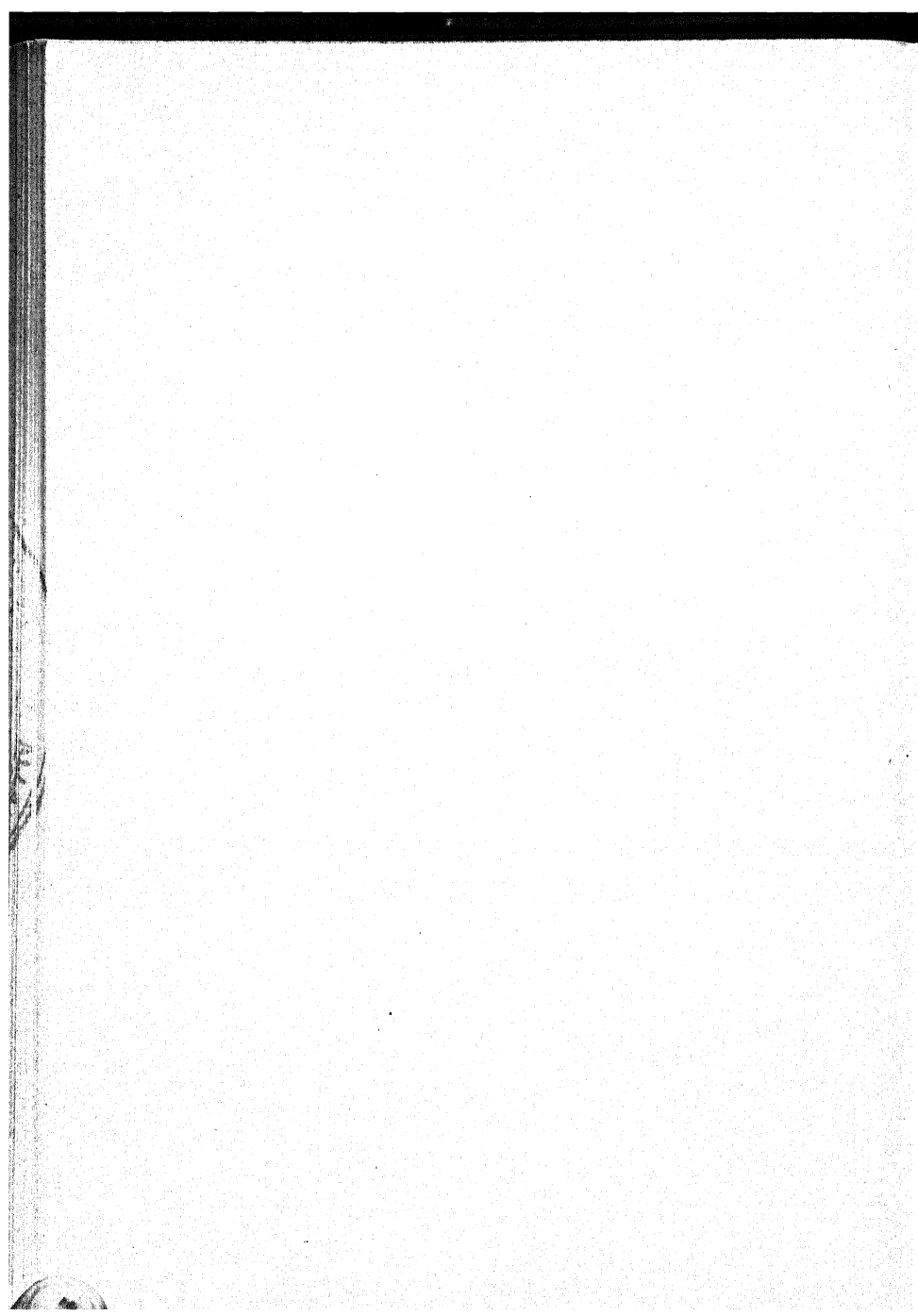
L. M. Terman and M. A. Merrill, *Measuring Intelligence*. Boston, Houghton Mifflin Company, 1937.

A. E. Traxler, *Nature and Use of Reading Tests*. New York, Educational Records Bureau, Bulletin No. 34, 1941.

C.-E. A. Winslow, *School Ventilation*. New York, Bureau of Publications, Teachers College, Columbia University, 1931.

Robert S. Woodworth, *Psychology*, Fourth Edition. New York, Henry Holt and Company, 1940.

Index



Index

- Achievement tests, 164, 165, 189
- Admission to courses by test, 165, 168, 188-189
- American Psychological Corporation, cited, 186
- Anecdotes, 19, 22, 75, 176
- Answers, students', 46-47
- Aptitude tests, 164, 165
- Assignments, 25, 37, 72, 135-136, 139
- Attention, 11, 22-23, 43, 101, 107, 150; lack of, 28, 45, 110-111, 185
- Basic English, 193
- Berdan, John, cited, 20
- Blackboard, 121-124
- Bluffing, 55, 112
- Bookcases, 121, 127-128
- Book review, 93
- Books. *See* Reference books; Textbooks
- Bright students. *See* Students, superior
- Buildings, 116-120
- Bulletin board, 127, 141
- Buros, O. K., *The Mental Measurements Yearbook*, recommended, 168, 199
- Chairs, 111, 120, 125-126
- Chalk, 121
- Class, list of, 99, 100; occupations for, in emergencies, 20, 31-32, 35, 81, 97-98
- Class period, first, 97-106; length of, 26, 189-192
- Classroom, standard, 117
See also Equipment
- Classroom furniture, 61, 111, 120, 124-127
- Competition, 151-152
- Concentration, 143, 144
- Conferences with students, 63, 105-106, 131-132, 177; on marks, 174-175
- Confinement, as punishment, 113, 114
- Consultant, educational, 120, 179, 181
- Counselor, guidance, 176-177
- Credit, extra, 136
- Delivery, teacher's, 27-28
- Demerits, 114
- Demonstration, 14, 29-35, 68, 73-74
- Deprivation of privilege, as punishment, 113, 114
- Desks, 61, 111, 120, 125-126
- Determination, 11, 137, 138
- Diagnostic tests, 164, 167-168

- Differences. *See* Individual differences
- Discharge, as punishment, 113, 114
- Discipline, 51, 87, 89-90, 101, 103, 107-115, 185-187
- Discussion, 14, 37, 50-64; with students, of teaching methods, 47-48, 64, 90
- Dismissal, as punishment, 113, 114
- Disorder, prevention of, 109-111, 112; on field trip, 87, 89-90
See also Discipline
- Drill, 9, 29, 38, 43, 52, 145-154
- Educational Film Catalog*, recommended, 77
- Educational Screen*, recommended, 77
- Effort, essential to learning, 9, 10, 148, 153, 186; marking of, 173-174
- Employment manager, 185-186
- English, basic, 193
- Enthusiasm, 150
- Equipment, classroom, 61, 111, 116-128
- Evaluation of results of teaching, 27-28, 35, 49, 63-64, 75, 82
- Examinations, 15, 37, 46, 92, 159, 197; grading of, 171; teacher's attitude to results of, 7-8
See also Objective tests; Standardized tests
- Exhibits of students' work, 76, 83, 90, 94
- Extra work, as punishment, 113, 114
- Failure of students, 140, 148-149, 165
- Fatigue, students', 187
- Ferber, Edna, quoted, 144
- Field trip, 85-90
- Film strips, 76, 82, 184
- Fines, as punishment, 113, 114
- Firmness, 112
- Follow-up, of field trip, 90; of motion picture, 81-82
- Foreign languages, 188-198
- Forgetting, 9-14
- Furniture, classroom, 61, 111, 120, 124-127
- General-knowledge tests, 164
- Gibbs, Josiah Willard, cited, 172
- Grading, of examinations, 171; of standardized tests, 158-160
See also Marks
- Grammar, in learning foreign languages, 196
- Group projects, 94
- Guidance, 176-177
- Habits, students', of study and work, 66-68, 74-75, 141-142, 143, 144
- Hearing, ensuring of class's, 27, 32-33, 73-74
- Heating. *See* Temperature
- Hopkins, Mark, 116
- Humor, 4, 32

- Inattention, 28, 45, 110-111, 185
 See also Attention
- Individual differences, 20-21, 129-136, 152, 198
- Industrial training, 178-187
- Informality in the classroom, 48-49
- "Information, Please!", 36-37
- Intelligence tests, 164, 165-167, 176
- Intensity, a factor in memory, 10
- Interest, a factor in learning, 38, 137-138, 187, 194; instructor's, in students, 3, 5, 99, 103, 186, 187
- Kaulfers, Walter, cited, 195
- Knowledge, general, tests of, 164
- Laboratory, teaching in, 14, 29, 30, 65-75
- Languages, foreign, 188-198
- Learning, 9-14, 38, 137, 146-150, 153, 186, 187, 194
- Lecture, 14, 16-28, 29, 52, 68
- Library, of visual aids, 83
- Library table, 127-128
- Lighting, classroom, 111, 118-119, 142-143, 186
- Loyola, St. Ignatius, cited, 139
- McKown, Harry C., and Alvin B. Roberts, *Audio-Visual Aids to Instruction*, recommended, 77, 199
- Marks, 46, 140, 170-175
 See also Grading; Scoring
- Mastery, essential to memory, 10
- Mathematics tests, 164, 167, 176, 177
- Mean, 157
- Mechanical-aptitude tests, 176
- Median, 157
- Memory, 9-14, 38, 52, 149, 153-154
- Mental ill-health, 111-112
- Method, choice of, 14-15; courses in, 179
- Mistakes, correction of students', 37-38, 153-154
- Mnemonics, 149, 153-154
- Models, for drill, 146, 148; in visual education, 76, 83, 184
- Motion pictures. *See* Visual education
- Motivation, 22, 194
- Movies. *See* Visual education
- Names, knowing students', 12-13, 99-100, 101
- Notes, instructor's, 19, 25-26, 31, 41; students', 28, 90, 144
- Objectives, defining of, necessary, 14, 18, 20, 39, 41, 54, 60, 65-66, 68, 107
- Objective tests, 37, 155-156
- Ogden, C. K., cited, 193, 200
- Outline, student's, 139-140, 144; teacher's, of course, 103; teacher's, of lecture, 22-23
- Overlearning, 11, 154
- Papers, written, 57

- Passing objects around class, 34-35
- Penalties, 113-115, 138
 See also Discipline
- Percentile, 158-159
- Period length, class, 26, 189-192;
 drill, 152, 154; between drills,
 152, 154; study, 143; test, 156-
 157
- Personnel manager, 185-186
- Phonograph records, in teaching
 foreign languages, 191-192,
 196
- Planographed materials, 182
- Poor student. *See* Student, inferior
- Position in class, 158-159, 173
- Praise, use of, 46, 47, 61, 62, 75,
 140, 149, 187
- Preparation by instructor, 5-7,
 18-22, 187; for demonstration,
 30-32; for discussion, 54, 55,
 56; for field trip, 86-88; for
 first class, 99-100; for laboratory
 and shop, 68-70; of problems,
 93; of questions, 39, 41;
 for visual education, 77-81, 83
- Probation, as punishment, 113,
 114
- Problems used in teaching, 39,
 42-43, 57, 91-94, 136
- Projectors, 121
- Projects, 69; group, 94
- Pronunciation, in learning foreign
 languages, 195
- Punishments, 113-115
 See also Discipline
- Purpose. *See* Objectives
- Quartile, 157-158
- Questioning, by students, 24-25,
 28, 35, 37, 80, 103, 106; of
 students, 39-46, 55-56, 57-58
- Questionnaire, for first day, 101,
 102
- Rank, student's, in class, 158-159,
 173
- Raw score, 159
- Reading, materials for, in language
 courses, 196-197; students' ability
 in, 18; tests of, 164, 167-168,
 176, 177, 200
- Recitation, 14, 36-49, 52, 55, 56
- Records, student, 131, 170, 174-
 177; kept by student, 141
- Rectification, as punishment, 113,
 114
- Reference books, 19-20, 55; use
 of, in classroom, 134
- Regulations, classroom, 101-102,
 109
- Removal, as punishment, 113,
 114
- Repetition. *See* Drill
- Restlessness, 110-111
- Review, 53-54
- Roberts, Alvin B., and Harry C.
 McKown, *Audio-Visual Aids to
 Instruction*, recommended, 77,
 199
- Richards, Ivor K., cited, 193
- Rules, classroom, 101-102, 109

- Sarcasm, 44, 112-113
- Satisfaction, a factor in learning, 9, 140-141, 148-149, 186, 194-195
- Scales of marking, 172-173
- Schedules, teaching, 4-5, 121, 181, 189-192
- Scoring of tests, 159-160, 162, 169
- See also* Grading; Marks
- Seating plan, 100
- Seeing. *See* Visibility
- Semi-independent activity, 132
- Shaming, 112-113
- Shop, teaching in, 65-75
- Shyness. *See* Students, shy
- Sims, Admiral William Sowden, cited, 109, 200
- Size of class, in foreign-language course, 189-192
- Slide-films, 76, 82
- Slides, 76, 82-83, 184
- Sound motion pictures. *See* Visual education
- Spacing of drills, 154
- Standardized tests, of achievement, 164, 165, 189; administration of, 161-163, 169; of aptitude, 164-165; choice of, 168-169; diagnostic, 164, 167-168; of general knowledge, 164; grading of, 158-160; in industrial training, 185-186; of intelligence, 164, 165-167, 176; in language courses, 188-189, 197; length of, 156-157; of mathematics, 164, 167, 176-177; of mechanical aptitude, 176; objectivity in, 155-156; of reading, 164, 167, 168, 176, 177, 200; records use, 176; scoring of, 158-160; standardization of, 157; timing of, 162; types of, 164-165; uses of, 165-168; wording of, 155-156
- See also* Examinations
- Students, inferior, 20-21, 62, 129-130, 135; overtalkative, 63; shy, 46, 62, 63; superior, 3, 74, 129-130, 135, 165, 166, 173-174
- Study by students, 20, 105, 137-144; supervised, 133, 134
- Summary, of period's work, 23, 49, 56; of records, 175-176
- Supervision of new teacher, 179
- Supplies, 121
- Suspense, attribute of lectures, 22-23; during questioning, 44
- Teacher, characteristics of good, 3-8, 108-109, 178, 198
- Teaching, evaluation of. *See* Evaluation
- Temperature of classroom, 110, 111, 119-120, 142-143
- Tests, objective, 37, 155-156; standardized, *see* Standardized tests
- Textbooks, 16, 17-18, 19, 103, 105, 182-183
- Thoroughness. *See* Overlearning
- Threats, in discipline, 112-113

- Timing, in class, 15, 26-27, 31, 79, 97-98, 106; of tests, 162
- Tools and apparatus, issuing of, 70-71
- Translation, in language teaching, 197
- Underlining, 144
- Understanding, fundamentals in, 138-140; handicaps to, 18; lack of, 38, 41; laws of learning, 9, 11, 146-147; lectures and, 16; promotes discipline, 186-187; recitation and, 40
- United States Office of Education, 77
- Use, and memory, 10
- Ventilation, 111, 119-120, 121, 142-143, 186, 200
- Visibility, ensuring, 32-34, 73-74
- Visual education, 75-84, 183-184
- Voice, teacher's, 27
- Warming up, 22, 42-43, 56, 57
- Wording of questions, 40-41, 44; in tests, 155-156
- Work, extra, as punishment, 113, 114
- Work sheets, 134-135